

FLORA OF ASSAM

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RANUNCULACEÆ TO ELÆOCARPACEÆ



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PREFACE

The first volume of the "Flora of Assam" is presented to the public. A considerable time has elapsed since the first conception of publishing a comprehensive account of the Flora of the province as a botanical unit and an apology is necessary for the delay, but for a large work of this nature it was inevitable. The death of Rai Bahadur U. N. Kanjilal, who originally undertook this work, caused the first interruption and then his son Mr. P. C. Kanjilal, I.F.S., B.Sc., of U. P. who agreed to continue the task from a sense of filial duty, had to return to his province before publication of this work could be taken up. The present writer, who succeeded Mr. P. C. Kanjilal, had to face great difficulties with the selected Press, which proved both highly unsatisfactory and dilatory, so much so that new publishers have had to be found. It is now hoped that the publication of succeeding volumes up to Coniferae will not present any further difficulties.

Monocotyledons will, it is presumed, be an entirely separate publication.

Shillong,

A. DAS

15th April, 1934.

INTRODUCTION

Assam Flora is by no means an untrodden ground. Wallich and Griffith explored parts of the province and Sir Joseph Hooker himself paid a visit to the Khasi Hills. Many enthusiastic collectors namely Klien of Cachar, De Silva of Sylhet, Peal of Sibsagar and Commissioner Jenkins of the Brahmaputra Valley contributed large numbers of specimens to the Sibpur herbarium. In recent times perhaps the most energetic worker in this field was Mr. C. B. Clarke, who traversed the whole province several times on foot and made a very extensive collection. Mr. Gustav Mann (the first Conservator of Forests in Assam) has left for his successors a fairly large collection of specimens besides generally contributing to the Sibpur herbarium. Mr. Burkill visited parts of the Khasi Hills and N.E. F. Tract.

Parties of the Botanical Survey of India have, from time to time, been sent out from Sibpur to collect specimens in selected localities.

What was wanting was that no one collected with any idea of presenting to the public a comprehensive 'Flora of Assam' as a botanical unit. This idea was first conceived by Chief Commissioner Sir Archdale Earle, an ardent lover of plants and a keen amateur botanist, and under his patronage the late Rai Bahadur U. N. Kanjilal began working on the compilation of a 'Flora of Assam'. Unfortunately his death before the publication of even the first volume retarded the progress of the work, but his monumental collection, elaborate field notes and drafts have been invaluable to his successors. In subsequent years the collections of Mrs. N. E. Parry in the Garo and Lushai Hills and that of Dr. N. L. Bor, D.Sc., I.F.S., in the Naga Hills and Aka Hills have been a great asset to the province. Mr. P. C. Kanjilal, I.F.S., B.Sc., whose services were obtained on loan from U. P. on the death of his father and who had to return to his province was concerned chiefly in the determination of species, in replenishing the herbarium

and inaugurating a proper herbarium for Assam out of the material available.

He completed the final draft upto Calycifloræ and described a few families of Apetalæ before leaving Assam. Thanks are due to him for his absorbing interest in this work and labour of love, so much so that he ungrudgingly devoted his entire leave (nearly 10 months) making progress in his work. It fell to the lot of the writer to complete the work up to Conifera, to replenish the herbarium and see it through the Press.

Thanks to the combined labour of many workers, the Assam Flora is fairly well represented in the herbarium of the Royal Botanic Garden at Sibpur through which,—Kew and many other herbaria have received contributions. It may also be mentioned here that the Assam Herbarium has also contributed to the herbaria at Sibpur, Dehra Dun, Gauhati and other places.

The arrangement of the families have been based mainly on Betham and Hooker's *Genera Plantarum* which has been hitherto generally followed in this country. A few modifications have been made in conformity with modern conceptions where necessary and the termination of *acea* has been adopted for all families according to present conventions.

Some herbaceous plants have been included, which are beyond the real scope of this work and also a few, that are properly speaking not indigenous to the province. Their economic value and botanical importance warranted this step.

As far as practicable forest characters have been given for the identification of the important forest species *in situ*.

Many new species have in recent years been recorded from the province in different publications of which there are no specimens in Indian herbaria. As far as practicable these have been included.

A new Magnoliaceæ was discovered by the writer in Digboi Reserve in Lakhimpur District, but as he was then engaged in Divisional Forest work, the investigation of the species could not be taken up by him in time.

At the request of Mr. Dandy of the British Museum, complete specimens were forwarded to him who described the plant as *Pachylarnax pleiocarpa*, Dandy. (*Journal of Botany*, November, 1933.)

The following species, new to science, have recently been described and published (The Assam Forest Records Vol. I, 1934)—

- Eurya japonica* var. *nitida* forma Kanjilali. (Ternstroemiaceae.)
- Sterculia khasiana*. (Sterculiaceae.)
- Gymnocladus assamicus* (Leguminosae-Caesalpinieae.)
- Lagerstrœmia minuticarpa*. (Lythraceae.)
- Agapetes Kanjilali*. (Vacciniaceae.)
- Maba cacharensis*. (Ebenaceae.)
- Symplocos Pealii*. (Styraceae.)
- Chirita mishmiensis*. (Gesneraceae.)
- Strobilanthes furcatus*. (Acanthaceae.)

A new Myrtaceae (*Eugenia*) and some Lauraceae are under investigation and revision of the Assam Phœbes has also been undertaken by the writer and it is hoped that the results of these investigations will be included in the Flora.

The following annexures are given :—

- (1) An Ecological Sketch of the Botany of the Province by the late Rai Bahadur Upendra Nath Kanjilali.
- (2) A Note on the Geology of Assam by Mr. Evans, Geologist to the Burmah Oil Company Limited.
- (3) A Note on Climatology.
- (4) Bibliography.
- (5) Synopsis of Families.
- (6) Glossary of Botanic Terms.
- (7) List of Abbreviations and Signs.

It now remains to acknowledge indebtedness to all those who have rendered assistance in the compilation of this voluminous work.

- (i) Director of Royal Botanic Garden Sibpur ; Directors of Kew and the late Mr. J. S. Gamble contributed enormous help in determination of the species and scrutinising dubia sheets.
- (ii) Most of the Forest Officers of the province have contributed by supplying good collections of specimens and furnishing vernacular names which enabled me to make it comprehensive.
- (iii) Mr. Evans has contributed a most interesting Geological note of the province and the Director

Meteorological Department, Poona, has supplied details of records of humidity and temperature of the different stations in the province.

I am personally grateful to Messrs C. C. Calder, Superintendent, Royal Botanic Garden, Sibpur, K. Biswas, M.A., Curator, Sibpur Herbarium, and C. E. Parkinson, Forest Botanist, Forest Research Institute and College, for their ungrudging help in all possible directions, to Mr. C. Purkayastha for going through the proofs and also to the authorities in Assam for their encouragement without which it would not have been practicable for me to complete and publish this voluminous work.

Shillong,
1st May, 1934.

A. DAS.

A BRIEF ÉCOLOGICAL SKECTH OF THE BOTANY OF ASSAM.

Rainfall and the configuration of the ground are the two chief factors which control the distribution of the plants and their grouping into the main types of forests association.

The province consists of two large valleys, the Brahmaputra and the Surma, separated by a range of comparatively low hills.

The Surma Valley is almost due north from the apex of the Bay of Bengal and is directly open to the N.-W. monsoon. The hills on the northern border of this valley are cliffy almost throughout and present an abrupt barrier to the ruin clouds, with the result that extraordinarily heavy precipitation takes place over the cliffy region which subjects the valley to very heavy floods. The notoriously wet Cherrapunji is situated on the brow of one of the cliffs of this region.

The Brahmaputra Valley is much less open as it presents only its mouth at the western end rather tangentially to the monsoon current. It receives its rain partly from the half-spent clouds that soar above the Mikir Hills and drift northward and partly from those which enter the valley at Dhubri. In the angle formed by the Mikir and the Naga Hills there is a belt which is away from the main direction of the Brahmaputra current and over which the Surma Valley clouds pass without precipitating. This belt is the driest region in the whole province, the rainfall being as low as only about 40 inches. Another belt of low rainfall lies along the foot of the Himalayas extending from the Champamati river in Goalpara to the Panch Nadi in Darrang. The Brahmaputra clouds pass up away from this belt and it can get no benefit from the Surma clouds. Both currents impinge on the next range or Hills, the Himalayas, at a point opposite Tezpur and they combine to drift towards the apex of the valley giving very heavy rains to Sadiya, Dibrugarh and adjoining tracts.

The two dry belts mentioned above are characterised by having a pre-eminently deciduous type of forest, whereas the regions of heavy rainfall are clothed with evergreen forests.

The Sal-bearing areas of the Province are intermediate between the above two extremes where the rainfall is well below 100 inches. As might be conjectured some Sal tracts are so wet as to partake of the character of evergreen forests, for example, those near Haltugaon in Goalpara and some parts of the Boko Range in Kamrup, but the main Sal areas belong to the deciduous type.

Swamp forests own their origin chiefly to configuration of the ground sometimes aided by the occurrence of an impervious substratum such as clayey or rocky beds.

Extensive grass lands occur in the deciduous tracts, also in the riparian areas of the Brahmaputra and its tributaries.

It will be seen from the above that the flora of Assam comprises the following types of forest.

1. Evergreen Forests
2. Deciduous Forests
3. Swamp Forests
4. Grass-lands

1. The Evergreen Forests

This type of forests occupies the major parts of the Frontier District, Lakhimpur, Sibsagar, Sylhet, Cachar, also in a more or less continuous narrow belt along the foot of the Himalayas from the extreme N.-E. corner of the Province as far west as the Panch Nadi in the Darrang District. It also occurs in the S.-E. portion of the Nowgong District along the A. B. Railway and in the greater parts of the Khasi Hills including the tracts covered by the Khasi Pine (*Pinus Khasya*), also in isolated pockets in the deciduous types of forests throughout the province.

The evergreen forests consist of a bewildering number of species, chiefly of the following Families:—Dilleniaceæ, Anonaceæ, Magnoliaceæ, Guttiferæ, Leguminosæ, Myrtaceæ, Styracæ, Ebenaceæ, Myristicaceæ, Lauraceæ, Euphorbiaceæ, Fagaceæ, Palmæ and Graminæ and in the hills Coniferæ, Vacciniaceæ, Ericaceæ, and Ternstroemiaceæ, also a much larger number of Fagaceous species. The actual species of the above Families occur in different tracts in varying proportions so that a particular species may form gregarious forests in some localities and at the same time be totally absent in adjoining parts.

The forests generally present a three-storied appearance of which the top storey is very often constituted by one or two deciduous species of enormous size such as *Dipterocarpus*

pilosus, *Artocarpus Chaplasha*, *Tetrameles nudiflora*. These trees tower above the rest of the forest more or less in an isolated manner. They are generally fast-growers and also deciduous; they can easily work their way through the crowns of the storeys now below them. The middle storey is formed either by a gregarious species, such as *Mesua ferrea*, or by a large number of mixed species of the families mentioned above. This storey determines the economic value of a forest. Where *Mesua ferrea* grows it is considered the principal species, but recently Bonsum which comprises two or three species of *Phabe* has fairly established itself in the Calcutta market and is very much more in demand than *Mesua ferrea*. *Lagerstramia Flos-Regine* is another well known timber tree, but strictly speaking it is not confined to the evergreen type of forests. *Terminalia myriocarpa*, *Amoora Wallichii*, *Duabanga sonneratioides* are other well-known timber trees in this type of forests. The third or lowest storey consists of small trees and shrubs, generally of no great economic value.

This type is characterized by a very large number of climbers notably the climbing *Acarias* and *Bauhinias*, several species of *Vitis*, *Unona*, *Uria*, *Mezoneurum*, *Calamus*, *Tapiria hirsuta*, *Entada scandens*, *Dalhousiea bracteata*, *Gnetum Gneton* and many others.

As indicated above the pine areas in the Khasi Hills fall under evergreen type of forests. The Khasia pine forms even-aged pure forests on moderately sloping hill-sides between 2500 and 6000 ft. A complete leaf canopy is formed at a very early stage and maintained till the high pole stage is well passed. This type of forest is remarkably free from climbers. Natural regeneration is easy to secure, but the Synteng Village Communities in the Jawai Sub-Division prefer to obtain new crops by sowing. All that is necessary after sowing is to close the plots against fire and grazing for a suitable period. Once the pine is established, the grass very soon disappears so that nothing is left to attract browsing animals. The pine is associated with several species of *Quercus* and *Castanopsis* with birch and in some places with yew, hornbeam and *Podocarpus neriifolia*.

Besides the pine areas we have in the Khasi Hills a very interesting type of forests commonly known as sacred forests. They generally occupy hill-tops and cool aspects as a rule above the pine zone. They belong to local chiefs or village communities and represent what may be called nature's

primeval forests. Until recently people did not dare to make fellings in these forests or obtain anything from them except fallen fruits and dead timber for fear of annoying the Sylvan gods believed to preside over them, with the result that we possess in them very rich store-houses of botanical treasures. It is indeed to these fascinating groves that the Khasi Hills owe the reputation they enjoy of being the richest botanical area not only in India, but perhaps in the world. Magnoliaceous, Fagaceous, and Lauraceous trees, generally of enormous sizes, are the predominating arboreal species besides such characteristic trees as *Dendropanax japonicum*, *Randia Wallichii*, *Croton lavigatus*, *Myrsine capitellata*, *Tournefortia baccata*, *Podocarpus neriifolia*, *Daphniphyllum himalayense*, *Eriobotrya bengalensis* and many others. But botanically speaking shrubs, undershrubs and herbs, if less showy are far, far more interesting. These however are so numerous that the writer is obliged to refrain from mentioning them in this very brief paper, and he frankly confesses that he is acquainted with only a very small proportion of them.

It is a great pity that the black foot of destruction is already visible in some parts; the ultimate disappearance of these charming groves is therefore only a question of time.

2. The Deciduous Forests

This type comprises all the Sal tracts as well as the major part of scrub forests in the province. It therefore takes in nearly the whole of the Goalpara and Garo Hills Districts and the greater part of Kamrup, Nowgong and the North Cachar Hills, also the western half of Darrang and the drier tracts of the plains of the Surma Valley.

In the Sal areas the usual companions of Sal occur with local variations. *Lagerstramia parviflora*, *Kydia calycina*, *Schinus Wallichii* and *Careya arborea* being perhaps more constant than the rest. *Gmelina arborea*, *Cassia fistula*, *Albizia lucida* and *odoratissima*, *Millettia velutina*, *Stereospermum chelonoides* occur in some localities.

Where there is no Sal as in the North Cachar Hills, and in the drier parts of Cachar and Sylhet, the forest is very mixed and consists chiefly of *Bombax malabaricum*, *Adina cordifolia*, *Stephegyne diversifolia*, *Cassia nodosa*, several species of *Ficus*, besides most of the associates of Sal mentioned above.

The differentiation of storeys is not so clear in deciduous forests as in the evergreen type. A certain amount of grass

is almost everywhere present, but no canes occur except in evergreen or marshy pockets here and there.

3. Swamp Forests

This type includes undrained depressions generally known as *Bils*. Swamps and Bils abound in the plains of Sylhet and Cachar some of the latter being so large as to deserve to be called lakes. If much smaller in size they are not uncommon in the Brahmaputra Valley chiefly in the grass lands in the riparian tracts and the Sal areas in Kamrup and Goalpara. Some of the latter are up to 5 miles in length and about 3 miles in breadth. Depressions of the former kind are mostly abandoned river channels but those in the Sal areas appear to owe their origin to earthquakes.

The following trees and shrubs are characteristic on the border of the larger Bils, especially of those situated in hilly tracts:—*Cratogeomys lophosperma*, *Eugenia cuneata*, *Duabanga sonneratioides*, *Terminalia myriocarpa*, *Lagerstrœmia Flos-Regina*, *Hyptianthera stricta*, *Symplocos Pealii*, *Ardisia khasiana*, *Rhabdia lycioides*, *Litsa ceylanica* and *angustifolia*, *Homonoia riparia*, *Antidesma Bunius*, *Trewia nudiflora*, *Ficus pyriformis*, *heterophylla*, *Cunia*, and *glomerata*, *Engelhardtia polystachya*, *Dracœna spicata*, *Clinogyne dichotoma*, etc., as well as the following grasses, *Hygrophysa aristata*, *Vossia procera*, *Panicum proliferum*, *kashianum*, *interrupum*, *plicatum*, *Myurus*, *Crus-galli* and *casum*, *Phragmites communis* and *Karka*, *Arundo Donax*, *Arundinella arenæa*, *Thysanotum Agrostis* etc. Some of the above grasses (*Hygrophysa*, *Vossia*, etc.) float on the surface and cover considerable parts of the water along the borders.

The following aquatic families are also well represented *Nymphaeaceæ*, *Araceæ*, *Lemnaceæ*, *Alismaceæ*, *Naiadaceæ*, *Eriocaulaceæ* and *Cyperaceæ*.

4. Grass-Lands

Pure grass lands are of two types in Assam, viz., the riparian tracts of both valleys and the belts of low rainfall mentioned above. Nearly the whole of the former is under water during the rains, and the permanent water-level is never so low as to be beyond the reach of the roots of the grass. Grasses of the following genera are characteristic of the riparian areas, *Saccharum*, *Anthisteria*, *Erianthus*, *Arundo*, *Phragmites*, etc. They cover extensive tracts along the

large rivers, especially where the banks are low. Most of them are remarkable for the enormous size their haulms attain, some being up to 20 ft. in height and nearly 2 inches in diameter at the base, so that they can easily hide large herds of buffaloes and even of elephants.

In the dry belts grasses generally smaller in size but of a more hardy nature predominate. In the Sub-Himalayan dry belt the permanent water-level is in places as low as 300 to 500 ft. below the surfaces so that the roots of the grasses have to draw sustenance entirely from the hygroscopic moisture of the surface soil.

The following grasses are characteristics of the dry tracts, *Imperata arundinacea*, *Apluda varia*, *Andropogon Icarancusa*, *Nardus contortus* and *squarrosus*, *Pollinia ciliata*, *Erianthus elephantinus*, *Panicum assamicum*, *Anthistiria giganta* and *strigosa* ; *Setaria glauca*, *Rottboellia protensa*, *Isachne australis* *Saccharum Narenga*, *Neyraudia madagascariensis* *Paspalum serobiculatum*, *Ischaemum ciliare* etc.

Shillong,

4th December, 1922.

U. N. KANJILAL

The Himalayan *sub-alpine* forests on the Northern Frontier of the Province has, of late years, been explored by Dr. N. L. Bor, who has made many interesting records of plant life from the area.

A. DAS

A SUMMARY OF THE GEOLOGY OF ASSAM

BY

P. EVANS, B.A., F.G.S.,

Geologist, The Burmah Oil Co., Ltd.

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PREFACE

Mr. H. M. Sale, Senior Geologist to the Burmah Oil Company in India, and Mr. P. Evans, the author of this note, have generously offered to regard this note, after modifications or amplification in the Geological Survey of India, as a joint production by an officer of this Department and Mr. Evans, so as to give expression to the fact that it is in part based on the pioneer work of the Geological Survey of India. This admirable summary of the geology of Assam has, however, been compiled entirely by Mr. Evans, and it is appropriate that he should be credited with the full authorship. Reference to the more important papers of his predecessors is provided by the appended Bibliography.

L. L. FERMOR,

Director,

GEOLOGICAL SURVEY OF INDIA

A SUMMARY OF THE GEOLOGY OF ASSAM

INTRODUCTION

Geological Formations

1. The geological formations of the province of Assam may be grouped as follows :—

Alluvium	}	Sedimentary
Tertiary		
Cretaceous		
Gondwana		
Igneous and Metamorphic.		

The major divisions are separated by unconformities.

Sedimentary Rocks

2. A large part of the province is covered by *alluvial deposits* of a very varied character—pebbles, sand, clay, and very commonly a mixture of sand and clay, often with much decomposed vegetable material. The *Tertiary beds* include a similarly varied assemblage of rocks—hard sandstones, soft loose sands, hard conglomerates, soft loose pebble beds, coal seams, shales, clays; clayey and shaly sandstones and sandy shales and sandy clays are very common. In several areas the more porous sands contain oil—usually present only in small quantities. The lowest Tertiary beds of some parts of Assam include thick limestones. A classification of the Assam Tertiaries has been worked out by the Eurmah Oil Company's geologists starting from the basis laid down by F. R. Mallet, one of the pioneers of the Geological Survey of India. The major divisions are

Dihing Series
(Probable unconformity)
Tipam Series
Surma Series
(Unconformity)
Barail Series
Jaintia Series
Diang Series.

These are placed in order of age (the Dihing Series being the youngest) excepting that the Disang Series is thought to be partly equivalent to the Jaintia Series. The *Cretaceous* beds are mainly sandstones and conglomerates but include some shales and thin coal seams. The *Gondwana* beds include quartzites and shales also with thin coal seams.

Igneous and Metamorphic Rocks

3. Igneous rocks, other than those forming part of a metamorphic complex, are not very abundant, basalt being the most important rock. Serpentine is found in association with slightly metamorphosed shales and amongst the older metamorphic rocks are gneisses, schists and quartzites. Granite, peridotite and dolerite are found intruded into the metamorphic rocks.

Topographical Divisions

1. The topography and geology of Assam are so intimately related that it is convenient for descriptive purposes to adopt the usual topographical divisions of the province. Assam may conveniently be divided into five parts—

From north to south:—

- (i) The Aka, Abor, Mishmi and neighbouring hills forming the eastern part of the Himalayas
 - (ii) The Brahmaputra Valley
 - (iii) The Central Assam Range—including the Garo Hills, Khasi and Jaintia Hills, North Cachar Hills, Mikir Hills
 - (iv) The Surma Valley
- and forming the eastern and south-eastern portions of the province—
- (v) The Naga Hills, Manipur, and the Lushai Hills

5. In general, the two valley areas are largely alluvial; the Central Assam Range is mainly gneiss with a fringe of Tertiaries on the south and east; the northern ranges include metamorphic rocks with a fringe of Tertiaries on the south; and the remaining area—the eastern, south-eastern, and the southern part of the province—is composed principally of Tertiary rocks.

6. The connection between geology and topography is so very close that the geologist visiting Assam soon recognizes that in the greater part of the province every major hill range and valley is a direct or indirect expression of some geological feature. The geology of the province has not yet been sufficiently elucidated to permit a full reconstruction of the geological history, but for the more accessible areas it is possible to indicate with certainty the general process by which the present topographical features have been developed.

7. In many parts of the country there is, too, a close connection between the geology and the type of jungle, but this is to some extent masked by the recent history of the area, as for example, the extent of recent Jhum operations, and by the variations in climatic conditions. The type of relationship found may be illustrated by the distribution of thorny canes which, in the hilly tracts, often occur in quantity in association with sandstones, not on the scarp faces but on any water-logged level stretched above the actual scarp.

8. The following notes describe the strata and structure and give some account of the topography of the five areas enumerated above, taken for convenience in the following order:—Surma Valley, South-Eastern Hills (Naga-Manipur-Lushai Hills), Assam Valley, Eastern Himalayas, Shillong Plateau (including the Mikir Hills, etc.). Following this is a summary of the geological history of the whole province.

9. The information utilized in this summary is derived, for the older rocks, from the observations of the Geological Survey of India and for the Tertiaries mainly from the work of the Burmah Oil Company's geological staff.

TOPOGRAPHY, STRATA, AND STRUCTURE

The Surma Valley

10. The main part of the Surma Valley consists largely of swampy flats broken by numerous low isolated hills (tilas) and low ranges. Northwards it ends abruptly against the foot of the Garo and Khasi and Jaintia Hills but the south-eastern boundary is of a different character—long spurs of high land project from the Lushai and Tripura Hills, and between them are broad valleys usually diversified with many low isolated hills and low ranges. The difference results from the difference in geological structure: the

northern boundary is determined by the existence of an east-west 'monoclinial' fold separating the Tertiaries of the Surma Valley from the older rocks of the Shillong Plateau, but along the southern boundary the strata have been buckled or folded into north-south wave-like 'corrugations' which give rise to the alternations of lines of hills and valleys; not every line of hills is a line of uplift ('anticline'), nor is each valley a line of depression ('syncline') for the folding has led to the development of long, nearly straight, north-south valleys by the wearing away of the less resistant beds, particularly clays and shales, leaving parallel ridges where the harder strata have more successfully withstood the denuding action of the rain and streams; in a few instances, where the beds exposed in the centre of an anticline are relatively soft, a valley may coincide with an axis of uplift. Thus, although the very clearly-marked suite of parallel north-south valleys and hills is due primarily to the trend of folding, it is in part an indirect result.

11. In the corrugations, the tops of the arches are usually narrower than the bottoms of the troughs and the inclined flanks separating crest from trough are very steep, the strata dipping at high angles. In many instances one of the flanks of the fold is much steeper than the other, and in these asymmetric anticlines it is common to find strike-faulting accompanied by vertical and inverted strata.

12. The strata of the Surma Valley belong entirely to the newer divisions; even the oldest series of the Tertiaries is not found in the valley itself, although it occurs in the low foot-hills of the Shillong Plateau. The oldest rocks found within the valley are the sandstones of the Barail Series, but these occupy a very small area. The lower beds of the Surma Series form fairly high and usually compact groups of hills; these are generally unsuited to tea-growing and are mostly covered with jungle; the Harargaj range between the Juri and Manu valleys forms a typical example. The beds include alternating groups of impure sandstones and impure shales. The upper beds of the Surma Series are mainly soft sandy shales with thin sandstones; they naturally give rise to long strips of low swampy ground broken by lines of tilas. Many of the lower more scattered hills of the Surma Valley are made up of sands and subordinate sandy and mottled clays belonging to the Tipam Series. The lower beds of the Tipams are usually much harder than the upper beds, and as they are also harder than the immediately underlying strata of the Surma

Series, the lowest part of the Tipams usually forms a prominent strike ridge. Most of the tea cultivation in 'tila' gardens in the Surma Valley is on the Tipam beds or the uppermost Surma beds. The highest division of the Tertiaries, the Dihing Series, which is made up largely of pebble beds, is found in a few low hills on the north and east of the valley.

13. An interesting feature is the occurrence of plateau gravels, deposited when the Barak and its tributaries were flowing at a level several hundred feet higher than to-day. There is an extensive plateau near Dewan (east of Silchar) and a higher more dissected plateau near Kumbhir (north-east of Silchar). On these there is a thick nearly horizontal capping of pebbles with some sands and sandy clay; most of the plateau is, or has been, under tea cultivation.

14. The flat ground is largely occupied by a rather clayey alluvium; most of this is utilized for rice but, especially in Sylhet, there are large areas too low-lying for any cultivation, and many of these contain large 'bils' or 'haors'—broad expanses of perennial water. In this alluvial ground the large streams have cut deep beds following very tortuous and unstable courses. Changes in these courses have led to the formation of many crescent-shaped lakes (frequently named Anua Bil) which in course of time become silted up, but remain easily recognizable by their characteristic shape. These old stream channels are commonly marked by a line of homesteads following very closely the former bank of the river.

The South-eastern Hill Country (Naga Hills to Lushai Hills).

15. The large area of hills forming the eastern and south-eastern borders of Assam and including the Naga Hills, Manipur, and the Lushai Hills is made up principally of Tertiary strata but it is possible that older formations occur in the areas furthest from the plains. Parts of this hill country have been examined in some detail but the geology of the more remote parts awaits investigation. Included in this area, both topographically and geologically, is the south-eastern part of the North Cachar Hills.

16. In the south—the Lushai Hills, western Manipur, and eastern Cachar—the structure is similar to and in continuation of that of the south-eastern part of the Surma Valley. Further north there is an interesting difference; the folding

in the Surma Valley was referred to as a series of north-south corrugations in which the arches are steep-sided, the strata in the steepest parts of the fold being vertical or even inverted, but in the Naga Hills, simple anticlines are rare and the folding has reached a much more advanced stage in which the steep limbs of the folds have become entirely or almost entirely replaced by strike-faults so that the country is traversed by a series of large overthrust faults. The most important of these is the Haflong-Disang fault which begins in the hills bounding the Surma Valley to the north of Sylhet and runs through Haflong, towards Piphima (near Kohima) and thence roughly parallel to the edge of the hills as far as the headwaters of the Dihing.

17. On the south-east side of this large fault, in the extremely hilly country between Haflong and Imphal, is a broad synclinal area composed chiefly of sandstones—these form an impressive escarpment south-east of the 'Hill Section' of the Assam Bengal Railway from Ditokchara to Mahur, and from the name of this range these beds have been termed the Barail Series. Further north-east around Kohima and Mokukchung in the Naga Hills District are lower beds—the Disang Shales—which are of great thickness and cover an immense area. In the interior of the hills the shales pass into slates and are traversed by abundant quartz veins, and in the extreme east by serpentine intrusions. They are everywhere very sharply folded and faulted and no details of the structure of the shale area have as yet been deciphered although it is clear that here and there there must be large 'outliers' of the Barail Series.

18. The Naga Tribal Area and the Frontier Tracts near the Patkai Range have naturally not been examined in much detail. The Patkai Range near the pass over to the Hukong Valley is a scarp of the sandstones of the Barail Series—one of the many ridges bounded on the north-west by a strike valley due to Disang Shales and to one of the overthrust faults. It is probable that most of the Naga Tribal Area is occupied by Disang Shales and the lower beds of the Barails.

19. In the area north-west of the Disang fault, that is, in the ranges bordering the Dhansiri and Upper Assam plains, there are numerous strike-faults roughly parallel to the Disang Fault. The dip of the strata is towards the south-east and the beds, which include Dihing, Tipam, Surma and Barail strata, are repeated by the faults; this has given rise to a series of nearly parallel ridges, not as well marked as

in the simpler structure of the Surma Valley, but very well seen from many points along the Manipur Road—Tinsukia section of the Assam Bengal Railway. The ridges are the escarpments of the harder beds—Tipam and Barail sandstones—and the intervening valleys mark the outcrop of softer beds and the position of the strike-faults.

20. In this area the Barail Series shows an interesting development; in the south-western part of the Naga Hills, interspersed amongst the sandstones in the middle part of the series, are considerable thicknesses of shale and carbonaceous shale. A few thin coal seams occur and when traced north-eastwards it is found that the seams thicken and become more numerous, until at Nazira they are of workable thickness. Further north-east they are still thicker and are worked on a large scale near Margherita and Ledo.

21. Above the Barail Series there is an important unconformity which represents an interval during which a large part of the Tertiary area of Assam was uplifted to form land and subjected to denudation. The emergence was greatest in the north-east, and here, not only is the upper part of the Barail Series missing, but the overlying Surma Series is very poorly represented, and in places the sandstones of the Tipam Series rest on the Barails.

22. With the exception of the Manipur plain, there is very little flat ground within the area of hills; the valleys are narrow and steep-sided and there are but few level stretches of alluvium in the valley bottoms. There are a few accumulations of high level 'gravels' or boulder beds in several parts of the Naga Hills, as for example near Ghaspani on the Kohima cart-road, and parts of the Disang Shale outcrop below the Barail scarp are almost completely covered by a thick mantle of sandstone boulders. These boulders form a useful source of road metal and ballast and are extensively worked at Ditokchara in the Hill Section.

The Assam Valley

23. The Assam Valley may be divided into two parts; in Lower Assam the plains are broken by isolated groups of hills but in Upper Assam almost unbroken plains stretch from the Himalayas on the north-west to the Naga Hills on the south-east.

24. The numerous low hills of Dhubri, Goalpara, Gauhati, and Tezpur are actually outlying portions of the Shillong metamorphic complex and are composed for the most part of gneiss. The surrounding plains have been

formed by the alluvial material brought down by the Brahmaputra and its tributaries. The Assam Valley is narrowest near the Mikir Hills, where the river first encounters the gneiss, and above this point the valley is entirely devoid of tilas. The extensive plains of Sibsagar and Lakhimpur are the alluvial deposits of the Brahmaputra and its tributaries; there are distinct traces of deposits of different ages, the most recent alluvium within the present flood plain, and various patches of older deposits at a slightly greater elevation. The geology of the alluvial area has not been worked out in any detail; on the whole, the alluvium is more sandy than in the Surma Valley. Towards the head and sides of the valley the surface is slightly undulating, and there occur, as for example near Dum Duma, examples of broad gently sloping alluvial 'cones' with irregular almost dry channels marking the site of old courses of tributary streams.

25. River terraces flank some of the streams; good examples are to be found along the Dihing at Margherita and much further upstream.

26. At the head of the Assam Valley there are low spurs (such as the Tipam Hills of Jaipur and Digboi) which are structurally a part of the Naga Hills.

27. The foot-hills bounding the valley on the north-west and south-east are composed of Tertiary deposits (as mentioned in the adjacent sections of this note) and deeply buried beneath the alluvium there must be a floor of similar Tertiary beds. The thickness of the alluvium is unknown but it probably amounts to some thousands of feet in the centre of the valley.

The Eastern Himalayas

28. North of the Brahmaputra Valley the hills curve round from an east-west direction in the Balipara Frontier Tract to a north-east trend which continues to the Dibang north of Sadiya. Thence there is a big sweep round the head of the valley to the Mishmi or Miju Hills.

29. The structure of these hills has not been worked out, although some of the main outlines are known. A belt of Tertiary beds occurs in the first ranges of the Aka, Dapla, and Abor Hills, but is absent further east; beyond the Tertiary belt there occur beds of Gondwana age, corresponding approximately to the coal-bearing beds of the Bengal coal-fields and indeed containing thin but crushed coal seams. In the Dihang Valley these are associated

with volcanic rocks—basalts and tuffs. Beyond the Gondwana beds are schists, slates, limestones, and dolomites of very great age.

30. The structure is undoubtedly complex for the beds dip north-westwards so that the Tertiaries appear to underlie the much older rocks. From evidence in Himalayan areas that have been examined in more detail it appears that the belts of different beds are separated by very large overthrust faults, similar to, but greater than, those which have been proved by detailed investigations in the Naga Hills. The successive sheets of rock have been thrust forward and upward from a north-westerly direction during the building up of the Himalaya.

The Central Assam Range

31. In the west, the Central Assam Range consists of a large broken plateau, usually termed the Shillong plateau; eastward, this merges into the more irregular hills of North Cachar and thence joins the Naga Hills. Geologically the two portions are quite distinct, the western part being an area which has undergone very little Tertiary folding and the eastern part belonging to the area of very intricate faulted and folded structure already described. Near Haflong the junction of the plateau country and the hill country is very sharply marked, coinciding with the Haflong-Disang overthrust fault, but in the northern part of the Assam Bengal Railway Hill Section the transition is more gradual.

32. The plateau reaches a height of over 6000 feet near Shillong; it has a general northerly slope but is much dissected by deeply cut valleys and is traversed by step-like scarps. The valleys are often notably straight and steep-sided and there are many large waterfalls in the rivers. The southern edge of the plateau overlooks the Surma Valley and is remarkably abrupt.

33. A large part of the area is occupied by metamorphic rocks of great age—schists, quartzites, and gneisses, with granites, peridotites and dolerites intruded into them. The details of the greater part of the metamorphic area have not yet been investigated. The gneiss is composed mainly of quartz and feldspar (orthoclase predominating) with subsidiary magnetite and very little hornblende and mica. Less ancient are the schists, slates, quartzites and conglomerates which have been grouped together as the Shillong Series. These rocks (especially the schists) have been invaded by basic dykes

and, apparently subsequently, there were the intrusions of granite.

34. The metamorphic rocks of the Shillong plateau extend northwards across the Brahmaputra Valley, forming low isolated hills at intervals west of Tezpur and higher hills near Gauhati and Goalpara. (The gneiss is very clearly seen near Gauhati in railway cuttings and in the river bank). Similar gneiss forms the greater part of the Mikir Hills.

35. Of much later age is the Sylhet Trap, an andesitic or basaltic lava found along the extreme southern margin of the plateau. This lava is associated with volcanic 'ash' and intrusive dykes.

36. Overlying the trap and the gneiss are Cretaceous beds—sandstones with conglomerates. These rest on a very irregular surface, filling up old valleys eroded in the metamorphic rocks in pre-Cretaceous times. The Cretaceous beds occur in the southern foot-hills and as isolated outliers scattered over a large part of the southern portion of the plateau; they form a belt extending across the plateau from near Jaintiapur north-eastwards towards the Mikir Hills. They occur near Lumding but are unknown further north-east. Coal seams occur locally and in places these are of workable thickness.

37. The Cretaceous beds are overlain by the lowest Tertiaries. These contain thick limestones (Sylhet Limestone) which provide an important source of lime; these beds are of considerable interest as their solubility in rain water has given rise to caves and underground rivers—phenomena that are characteristic of limestone areas. The outcrop is marked by numerous swallow-holes and at the base of the limestone cliffs there are often to be found copious springs of water. Associated with and above the limestones are sandstones and shales with a few thin coal seams. These beds lie almost horizontally (but with a very slight south-easterly inclination) over a large area in the eastern part of the plateau and extend north-eastwards into the Mikir Hills.

38. In the north-western part of the North Cachar Hills, sandstones of the Barail Series predominate and the beds are no longer nearly horizontal but have an undulating dip and are traversed by zones of disturbance; further east the disturbances increase and higher members of the Tertiaries appear in the synclinal areas: in this way the plateau zone passes into the parallel ranges of the Naga Hills.

FOSSILS

39. The strata of Assam are notable for the paucity of fossil remains. The Cretaceous beds contain a small fauna which has affinities with the Cretaceous fossils of Madras. The lowest beds of the Tertiaries contain a large number of fossils but the remaining, and by far the greater, portion of the Tertiary strata is almost barren, thus contrasting strongly with the very fossiliferous Tertiary beds of Burma.

40. The Sylhet Limestone is in places very largely made up of the hard shells of Nummulites but other fossils are much less abundant; the beds immediately overlying the Sylhet Limestone have also yielded a number of fossils in a few localities. In the upper Tertiaries, fossiliferous beds occur in the Garo Hills and at Kanchanpur in Cachar; these belong to the Surma Series. A few fossiliferous localities in the Tipam Series have been reported from the Naga Hills but the fauna is very poor.

41. This paucity of fossil beds makes it very difficult to correlate the strata of different portions of Assam and also prevents any very exact correlation between the Assam Tertiaries and those of the rest of India. The fossils of the Jaintia Series show that this belongs to the Eocene and is approximately of Kirthar (Lutetian) age. The Kanchanpur and Garo Hills fossil beds contain species characteristic of the lower parts of the Miocene.

HISTORY

42. It is not possible to reconstruct with any certainty the conditions under which the older rocks were formed, but it is clear that during a large part of Tertiary time almost the whole of the south-eastern part of Assam was under water: either open sea, coastal lagoon, or river estuary. (A possible exception is the east of Manipur, about which little is known). It is likely that during much of this period there existed land to the north-west—i.e., part of the Shillong Plateau.

43. It seems probable that during the earlier Tertiary times there was a shore line running roughly from south-west to north-east, through the Garo, Khasi, Jaintia, and Mikir Hills. To the south-east lay a broad sea which was continuously receiving sediments from the denudation of the neighbouring land. At some time in the Oligocene period part of the sea became almost silted up and coal-

forming conditions prevailed over a large area in north-eastern Assam. At the end of Oligocene times important earth-movements took place and large areas of the sea covering most of Assam were converted for a time into land and were subject to weathering and denudation. Subsidence set in and during the Miocene period the shore line ran again through the Garo, Khasi and Jaintia, and Mikir Hills. The water lying to the south-east was very shallow and received vast quantities of sediment from the neighbouring shores, but the water-covered area was not completely silted up, as subsidence, on the whole, kept pace with deposition. Whether the water ever completely covered the Assam plateau is not known, but it is clear that at times there must have been very little of the province that was not submerged. The Tertiary sediments in places attained a thickness of over 40,000 feet.

44. Towards the end of the Miocene period very extensive earth-movements began ; there was a great change in the material brought down by the streams, widespread pebble deposits show the proximity of large rivers draining from the newly forming land. As these changes continued the land began to assume something of its present shape, but with far higher elevations than now exist. During this period the strata were in the south folded into the broad corrugations so typical of the Surma Valley, and in the Naga Hills (where they were subjected to stronger forces) the strata became broken up along immense faults, areas scores of miles in length and several miles wide being pushed forward many miles over their north-western neighbours and having in turn similar large fault masses pushed over them from the south-east. Somewhat similar but even more intense movements occurred in the Eastern Himalayas, the forces being in this case from the north and north-west. In this way great hills were piled up, leaving a broad depression between—the original of the Brahmaputra Valley. As these mountain-building movements proceeded, denudation removed tens of thousands of feet of rock from the hills, so in the course of time lowering them to their present level, the material removed being carried out to sea or deposited in the lower reaches of the streams.

45. That the mountain-building movements are still in evidence is shown by the frequent earthquakes. During the 1897 earthquake many changes of level took place and subsequent measurements indicated that the Shillong

Plateau as a whole had moved appreciably towards the plains on the south. In some of the streams in the Patkai range there are a number of partly silted up lakes and marshes which show that there, too, there has been quite recent movement along a line crossing the course of these streams. Similar comparatively recent earth-movements have produced smaller but important changes of level in the plains resulting in obstructions to drainage, and consequent water-logging of large areas.

46. The activity of present-day denudation of the hilly areas is indicated by the vast quantity of sediment carried down the rivers during the monsoon and by the abundance of landslips showing as prominent scars in the jungle-covered hills.

47. Although the larger valleys and hills owe their origin to the earth-movements that have folded and broken the Tertiary strata of the province, their present form is entirely due to weathering and to erosion by streams. It is often popularly supposed that the deep gorges traversing the hills (for example, the immense ravine seen from the Cherrapunji road, or the narrow valley of the Jatinga above Damchara) are rifts produced in the earth's crust by destructive earthquakes. This is not so; the gorges, as well as the less impressive valleys, are due to the erosion by the streams which are now, or were at some previous time, flowing through them. During the monsoon, the streams with their loads of sediment erode their beds and banks and, according to local conditions, either deepen or broaden their valleys. The harder more resistant strata tend to remain as ridges whilst the weaker beds rapidly get worn down into low ground, possibly getting completely covered by the debris resulting from the weathering of the harder beds.

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CLIMATE

In Assam the annual revolution of the seasons is not marked by the strongest contrast of temperature and of rainfall.

The climate of Assam in virtue of its constant high humidity has an alternation of summer and winter of which neither is extreme in its temperature.

The rise of temperature which in most parts of India follows rapidly on the vernal equinox, is, in Assam checked by frequent showers and thunderstorms, giving it a heavy rainfall during the spring or hot weather months.

The perpetual humidity, frequent and heavy rainfall and moderate temperature changes of a warm summer and cool winter especially distinguish the Valley of Assam.

The annual rainfall figures shown in the following table against each rainfall recording district in the province of Assam have been compiled from the record of five years from 1927-1931, supplied by the Agricultural Department, Assam.

District.	Normal rainfall.
Goalpara	109.05
Kamrup	81.12
Darrang	87.38
Nowgong	68.39
Sibsagar	88.19
Lakhimpur	113.17
Sylhet	135.45
Cachar	121.15
Garo Hills	107.05
Khasi & Jaintia Hills	229.23
North Cachar Hills	109.17
Sadiya Frontier Tract	143.82
Balipara Frontier Tract	96.54
Naga Hills	86.90
Manipur	59.91
Lushai Hills	108.02

The following average mean maximum and mean minimum temperatures have been calculated from the statements of the five years from 1927-1931.

Station.	M. Maximum.	M. Minimum.
Dibrugarh	81.39	65.77
Sibsagar	78.32	66.28
Tezpur	83.99	66.56
Gauhati	83.81	66.36
Dhubri	80.50	66.86
Silchar	85.57	67.41
Srimangal	86.92	66.00
Shillong	69.85	53.22
Cherrapunji	68.77	57.88

Average relative humidity calculated from figures
from 1927 to 1931

Station.	Average relative humidity.
Dibrugarh	89
Sibsagar	90
Tezpur	85
Gauhati	86
Dhubri	83
Silchar	86
Srimangal	85
Shillong	73
Cherrapunji	76

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SYNOPSIS OF THE FAMILIES.

The distinguishing characters of the families have been selected with special reference to the plants described. In the body of the work under each family an account of the family as a whole will be found. The plants here mentioned all belong to the Phanerogams or flowering plants. They are divided as follows :—

Cotyledons, two or more	...	A. Dicotyledons.
Ovules in closed ovary, fertilized through stigma .	...	a. Angiosperms.
Calyx and corolla both present.		
Corolla of distinct petals	...	i. Polypetalæ.
Calyx of distinct sepals ; petals hypogynous.		
Torus small or elongate, not expanded	...	1. Thalamifloræ.
Torus thickened or expanded into a fleshy disk	...	2. Discifloræ.
Calyx of combined sepals ; disk thin ; petals inserted on the calyx.	...	3. Calycifloræ.
Corolla of combined petals	...	ii. Gamopetalæ.
Calyx or corolla or both wanting	...	iii. Apetalæ.
Ovules naked, fertilized by direct contact with pollen	...	b. Gymnosperms.
Cotyledon one	...	B. Monocotyledons.

A. DICOTYLEDONS**a. Angiosperms****i. Polypetalæ****1. THALAMIFLORE.**

1. **Ranunculaceæ.** Sepals deciduous, often petaloid. Stamens numerous, anthers adnate, longitudinally dehiscent. Carpels numerous, free, 1-celled.

2. **Dilleniaceæ.** L. alternate, simple, penninerved, petioles sheathing. Fl. large, white or yellow. Sepals 5, imbricate, persistent, petals 5, caducous. Carpels one or many, more or less cohering, styles free.

3. **Magnoliaceæ.** Trees, shrubs or climbers. Leaves alternate, simple. Sepals and petals alike in whors of three, imbricate, deciduous. Stamens numerous. Carpels numerous, free or slightly cohering. Fruit a cone or spike.

4. **Anonaceæ.** Trees or shrubs, often scrambling. Leaves alternate, entire, exstipulate. Sepals 3. Petals 6. Stamens numerous, free. Carpels numerous, free or (Anona) confluent. Fruit succulent.

5. **Menispermaceæ.** Climbing shrubs or small trees. Leaves alternate, entire or lobed, usually palminerved, often peltate. Flowers small, unisexual, trimerous. Stamens as many as and opposite the petals or anthers sessile on a column. Ovaries 1 or 3, free. Fruit a drupe.

6. **Berberidaceæ.** L. alternate, glabrous. Sepals and petals alike, usually trimerous, caducous. Stamens opposite to petals, anthers adnate, as a rule opening by valves. Carpels distinct, often one only. Endosperm fleshy.

7. **Nymphæaceæ.** Aquatic-herbs. Leaves usually peltate. Sepals 4-5. Petals and stamens usually numerous. Carpels many in pits of the torus or confluent with it. Ovary 1 or more ovuled. Fruit a spongy berry or of nuts sunk in pits of the torus.

8. **Papaveraceæ.** Annual or perennial herbs. Leaves radical or alternate, stipules 0. Flowers often large, nodding in bud, regular; perianth and stamens very caducous. Sepals 2, hypogynous. Petals 4, 2-seriate, large, crumpled. Stamens very many. Carpels dehiscent by pores or valves.

9. **Fumariaceæ.** Annual or perennial herbs. Leaves usually divided, segments not jointed. Flowers small, racemed, irregular. Sepals 2, small, deciduous. Petals 4. Fruit a 2-valved, many-seeded capsule.

10. **Cruciferae**. Herbs, rarely undershrubs. Leaves cauline and radical, exstipulate. Flowers racemed. Sepals 4, free, imbricate. Petals 4, free, hypogynous. Stamens 6. Fruit either a 2-celled 2-valved pod, the valves deciduous and leaving the seeds on the persistent placentas (*replum*), or indehiscent, or transversely jointed.

11. **Capparidaceae**. Trees or shrubs. L. as a rule alternate, stipules often present and spinescent. Fl. usually bi-sexual, often zygomorphic. Sepals usually 4, petals 4. Stamens 4-5 or numerous, filaments filiform. Carpels connate into a 1-celled ovary with 2-4 parietal placentas, often on an elongated gynophore. Fruit baccate or capsular.

12. **Violaceae**. L. as a rule alternate, stipules small or leafy. Fl. regular or zygomorphic, sepals 5, imbricate, persistent, petals 5. Stamens 5, filaments short or 0, connective broad and often produced above, anthers connivent or connate round the ovary. Carpels connate into a one-celled ovary with usually 3 parietal placentas. Seeds small, embryo straight in a fleshy endosperm.

13. **Bixaceae**. L. alternate, simple, mostly dentate, stipules small or 0. Fl. regular, 4- or 5-merous, stamens usually numerous. Ovary 1-celled, seeds few, arillate or with pulpy testa.

14. **Flacourtiaceae**. Trees or shrubs, usually thorny. Leaves toothed or crenate. Flowers small, usually dioecious. Stamens numerous. Fruit a drupe with several 1-seeded pyrenes.

15. **Pittosporaceae**. L. alternate, simple, entire, stipules 0. Fl. regular, pentamerous and pentandrous; sepals free, as well as petals imbricate, anthers versatile. Embryo small, in copious endosperm.

16. **Polygalaceae**. L. alternate, simple, quite entire, stipules 0. Fl. bisexual, zygomorphic, sepals 5, the 2 inner larger, petaloid, petals 5 or 3. Stamens as a rule 8, filaments usually connate in a cleft sheath, anthers mostly opening by terminal pores.

17. **Tamaricaceae**. L. alternate, small, generally scale-like. Fl. regular, in spikes, racemes or panicles, sepals and petals usually free, pentamerous, sometimes tetramerous. Stamens as many as petals or twice their number. Capsule 3-5-valved, seeds tufted or winged.

18. **Hypericaceae**. L. opposite, often gland-dotted, stipules 0. Fl. regular, bisexual, sepals 5, imbricate, petals 5, contorted in bud. Stamens numerous, filaments usually connate into 3 or 5 bundles, anthers versatile. Endosperm 0.

19. **Guttiferae.** Juice resinous, yellow or greenish. L. opposite, simple, entire, usually coriaceous, stipules 0. Fl. regular, unisexual or polygamous, sepals 2-6, mostly in decussate pairs, petals as a rule 2-6, imbricate or contorted. Fr. usually indehiscent, seeds large, endosperm 0.

20. **Ternstroemiaceae.** L. alternate, simple, generally coriaceous, stipules 0. Fl. regular, as a rule bisexual, sepals and petals usually pentamerous and imbricate. Stamens generally numerous, ovary 3-5-celled.

21. **Dipterocarpaceae.** Resinous trees. L. alternate, usually coriaceous, simple, penninerved; stipules large, enclosing the bud. Fl. bisexual, regular, calyx-segments 5, some or all as a rule much enlarged in fr. Petals 5, contorted; stamens 5, 10, or more, anthers adnate to filaments. Fruit indehiscent, 1-seeded.

22. **Ancistrocladaceae.** Glabrous, woody climbers, not resinous. L. entire, stipules minute, caducous. Fl. bisexual, regular, pentamerous, calyx adnate to the 1-celled ovary, segments much enlarged in fr.

23. **Malvaceae.** Wood soft and light. L. alternate, mostly stipulate, generally palminerved, hairs usually stellate. Fl. as a rule bisexual, regular, supported by 3 or more bracteoles. Sepals 5, valvate, more or less connate, petals 5, base adnate to staminal-column, contorted in bud. Stamens numerous; filaments variously connate; anthers 1-celled.

24. **Sterculiaceae.** L. alternate, mostly stipulate, hairs often stellate. Sepals 5, valvate, more or less connate, petals 5 or none. Stamens commonly monadelphous, anthers 2-celled. Fr. a dehiscent capsule or a whorl of distinct carpels.

25. **Tiliaceae.** L. alternate, simple, stipules deciduous. Fl. regular, almost always bisexual. Sepals 5, usually connate, valvate in bud. Stamens numerous, anthers 1-celled. Ovary 2-10-celled.

26. **Elaeocarpaceae.** Trees. Leaves simple. Flowers usually hermaphrodite, rarely polygamous, in axillary racemes. Sepals 5, distinct. Petals 5, often 5-lobed torus. Stamens usually indefinite, never less than 10. Ovary sessile, 2-5-celled. Seeds pendulous.

2. DISCIFLORÆ.

27. **Linaceae.** Shrubs. Leaves alternate, glabrous, stipules minute. Flowers yellow, regular, bisexual. Sepals and petals 5 each, free. Stamens 5, connate at the base with small interposed staminodes. Disk inconspicuous of 2-3

glands adnate to the staminal-tube. Ovary 3-5-celled, cells spuriously 2-locellate. Fruit a capsule.

28. **Malpighiaceæ.** L. usually opposite, simple, entire, stipules small or 0. Fl. often zygomorphic, calyx 5-lobed, petals 5, often fimbriate. Stamens 10, sometimes unequal. Fr. usually of one or more winged samaras.

29. **Oxalidaceæ.** Generally herbs or undershrubs, rarely trees. Leaves alternate, compound. Flowers regular. Fruit a loculicidal capsule or a 5-lobed berry.

30. **Rutaceæ.** L. aromatic, dotted with translucent glands, stipules 0. Fl. regular, sepals and petals 4 or 5, stamens 4-5 or 8-10, filaments inserted on the outside of the disk.

31. **Simarubaceæ.** Bark bitter. L. alternate, stipules deciduous or 0. Fl. regular, small, often unisexual, sepals 3-5, usually connate, petals 3-5. Stamens as many as petals or double their number, inserted outside the disk.

32. **Ochnaceæ.** L. alternate, simple, glabrous, stipulate. Fl. regular, bisexual. Sepals 4 or 5, free, imbricate, persisting, petals 5 or more, deciduous, stamens 10 or many, anthers basifixed. Fr. of 3-10 one or few-seeded drupes.

33. **Burseraceæ.** Resinous. L. alternate, imparipinnate, sometimes 1-foliolate. Fl. small, regular, calyx 3-5-lobed, petals 3-5. Stamens as many as petals or twice their number, inserted on the disk or outside at its base. Ovary 2-5 celled, ovules 2 in each cell.

34. **Meliaceæ.** L. alternate, generally pinnate, stipules 0. Fl. regular, in cymose panicles, calyx small, 4-5-cleft, petals 4-5, stamens twice the number of petals, filaments generally united into a tube, disk between stamens and ovary often tubular.

35. **Chailletiaceæ.** L. alternate, entire, simple, stipules deciduous. Fl. 1-sexual or polygamous, petals 5, notched or bifid; stamens 5, disk of 5 glands, alternating with stamens. Ovary pubescent, 2-3-celled, ovules 2, collateral in each cell. Endosperm 0; cotyledons thick.

36. **Olcaceæ.** L. alternate, stipules 0. Fl. small, as a rule bisexual, calyx small or wanting, stamens opposite of petals or many. Ovary at base often 2-5-celled, ovules from a free axile placenta. Drupe 1-seeded.

37. **Icacinaceæ.** L. generally alternate, stipules 0. Fl. small, 1-sexual or polygamous, calyx small or wanting, stamens alternating with petals. Ovary 1-celled. Drupe 1-seeded.

38. **Aquifoliaceæ.** L. alternate, simple, usually coriaceous and evergreen, stipules minute. Fl. regular, usually 1-sexual, calyx 4-5-lobed, petals 4-5, connate at base. Stamens 4-5, alternating with petals, disk 0. Fr. a drupe, supported by the persistent calyx, stones 1-seeded, 2 or more.

39. **Celastraceæ.** L. simple, as a rule opposite, stipules minute or none. Fl. regular, small, bisexual or polygamous, calyx small, 4 or 5-lobed, persistent. Disk large, surrounding the base of the 3-5-celled ovary or partially enclosing it, stamens 3-5, rarely 10, inserted on the disk.

40. **Hippocrateaceæ.** Small trees or scandent shrubs. Leaves opposite, petioled; stipules small, caducous. Flowers small, white or greenish. Fruit of 3-flattened carpels connate at the base, usually dehiscent. Seeds compressed.

41. **Rhamnaceæ.** Branchlets or stipules often spinescent. L. simple. Fl. small, regular, calyx 4-5-cleft, lobes triangular, valvate in bud, disk lining or filling the calyx-tube. Petals inserted at the mouth of calyx-tube. Stamens opposite to petals, often enclosed by them.

42. **Ampelidaceæ.** Climbers. L. alternate, often compound. Fl. regular, calyx small, entire or 4-5-dentate; petals 4-5, valvate in bud. Stamens opposite of petals, inserted outside or between the lobes of the disk. Fr. a berry.

43. **Staphyleaceæ.** L. opposite, stipulate, compound, leaflets stipellate. Fl. regular, bi-sexual, pentamerous, stamens 5, inserted outside the disk. Ovary 3-celled.

44. **Aceraceæ.** L. opposite, stipules 0. Fl. regular, polygamous, calyx 5-12-parted, deciduous. Stamens 8, inserted outside or upon (rarely inside) the disk. Fruiting carpels winged.

45. **Sapindaceæ.** L. alternate (opposite in *Æsculus*), stipules 0. Fl. sometimes zygomorphic, mostly polygamous. Stamens inserted between disk and ovary, filaments usually hairy, disk frequently unilateral. Ovary 3-celled, often 3-lobed.

46. **Sabiaceæ.** L. alternate, stipules 0. Fl. small, calyx 4-5-partite, stamens 4-5, opposite to petals, anther-cells distinct, usually adnate to a large connective.

47. **Anacardiaceæ.** L. in most genera alternate, stipules 0. Fl. regular, calyx 3-5-cleft (spathaceous in *Gluta*), petals 3-5, rarely 0. Stamens alternating with petals, inserted under, rarely on the disk. Ovary in 2 genera inferior, drupe 2-5-seeded.

48. **Moringaceæ.** Wood soft. L. deciduous, alternate, bi- or tri-pinnate, pinnæ and leaflets opposite, glands at base of petioles and pinnæ. Fl. large, bisexual, pentamerous, petals unequal. Fertile stamens 5, opposite to petals alternating with sterile stamens. Fr. a long 1-celled 3-valved pod.

3. CALYCIFLORÆ.

49. **Connaraceæ.** L. alternate, imparipinnate or 1-foliolate, leaflets entire, coriaceous, stipules 0. Fl. usually bisexual and regular, pentamerous, petals linear-oblong, stamens 10, the epipetalous stamens generally shorter and often sterile. Carpels 5, free, mostly hairy, ovules 2, collateral. Fruiting carpel one, 2-valved.

50. **Leguminosæ.** L. stipulate, as a rule alternate and compound. Fl. bisexual, petals 5, in the majority of genera zygomorphic, stamens 10 or many. Carpel one, free, ovules usually numerous, attached to the inner suture. Fr. a 1-celled pod, endosperm generally 0.

51. **Rosaceæ.** L. stipulate, usually alternate. Fl. pentamerous, as a rule regular and bisexual, stamens usually numerous. Carpels mostly distinct, often adnate to and enclosed in the calyx-tube albumen 0 or scanty.

52. **Saxifragaceæ.** L. simple. Fl. regular, 4- or 5-merous, calyx free or adnate to ovary, stamens free, as many as petals, twice the number or numerous. Carpels 2 or numerous, usually connate, ovules numerous. Seeds small, embryo minute, in copious albumen.

53. **Droseraceæ.** Perennial herbs. Leaves rosulate or alternate, usually circinate in veneration. Calyx free from the ovary. Petals 4-8. Stamens as many as the petals. Capsule loculicidally 2-5 valved. Seeds numerous.

54. **Hamamelidaceæ.** L. alternate, stipules usually deciduous. Fl. in compact heads or spikes, usually bracteate, calyx-tube more or less adnate to ovary. Ovary 2-celled, styles 2, usually persistent. Testa shining.

55. **Rhizophoraceæ.** L. opposite, usually coriaceous and entire, scars of petioles mostly prominent, stipules interpetiolar, deciduous. Fl. regular, generally bisexual, calyx more or less adnate to ovary, limb 4-14-lobed, lobes as a rule persistent, petals as many as sepals, stamens usually twice the number of petals. Fr. coriaceous, usually 1-seeded.

56. **Combretaceæ.** L. simple, entire, stipules 0. Fl. usually bisexual and regular, calyx-tube adnate to ovary

and produced beyond it, segments 4-5, valvate, petals often wanting. Stamens as many as calyx-segments or twice their number, perigynous. Fr. generally angled or winged.

57. **Myrtaceæ.** L. simple, generally quite entire, either opposite with translucent glands or alternate without glands. Stipules 0. Fl. regular, generally bisexual. Ovary enclosed in and generally adnate to calyx-tube. Stamens many, inserted with the petals in the mouth of calyx-tube.

58. **Lecythidaceæ.** Usually trees. Leaves alternate not gland dotted, entire or toothed. Flowers regular, 2-sexual. Calyx-tube adnate to the ovary; lobes usually 1-6, valvate or imbricate. Petals usually 4-6. Stamens numerous, in many series, few sometimes sterile. Ovary inferior, 2-6, rarely more celled. Fruit indehiscent, usually a woody, fleshy or fibrous berry.

59. **Melastomaceæ.** Herbs or shrubs. Leaves opposite, simple, exstipulate. Flowers regular, showy, 4-5-merous. Calyx-tube partially adnate to the ovary. Petals free. Stamens twice as many as the petals; anthers longer than the filaments, curved, opening by apical pores. Ovary usually 4-celled. Fruit a capsule. Seeds many, minute.

60. **Lythraceæ.** L. generally opposite, simple, entire, calyx cup-shaped, persistent, segments valvate, often with intermediate teeth, petals when present imbricate and crumpled in bud. Ovary as a rule superior.

61. **Onagraceæ.** Herbs or undershrubs, sometimes aquatic. Flowers usually regular, 2 sexual. Calyx adnate or 1/2-adnate to the ovary (Trapa); lobes 2-5, usually 4, valvate. Petals alternating with sepals, rarely 0. Stamens as many or twice as many as the sepals. Ovary usually 2-4-celled. Fruit capsular and many seeded or indehiscent and 1-seeded (Trapa).

62. **Passifloraceæ.** L. alternate, usually lobed. Fl. regular, unisexual in Papaya, bisexual in Passiflora.

63. **Cucurbitaceæ.** Large climbing herbs. Leaves petioled, cordate, ovate, 5-angular or lobed. Flowers monœcious, all solitary, yellow, very large. Fruit fleshy, indehiscent, often large. Seeds ovoid or oblong.

64. **Begoniaceæ.** Flowers not symmetrical; stamens numerous, free or conjoined, anthers ovoid; placentas projecting from inner angle into carpellary chamber; styles free or only united at base; herbs or shrubs with more or less succulent leaves and stems.

65. **Datisceae.** L. deciduous, petiolate, broadly ovate. Fl. dioecious, male flowers—calyx deeply 4-lobed, petals 0, stamens 4. Capsule crowned by the persistent calyx-segments, the valves terminating in the persistent styles.

66. **Cactaceae.** Stems and branches succulent, prickly. Fl. regular, bisexual, solitary, calyx-tube adnate to ovary, petals numerous, imbricate, stamens many. Fr. fleshy, seeds numerous.

67. **Umbelliferae.** Herbs; fruit dry separating spontaneously into two dry indehiscent carpels with usually glandular vittae containing an essential oil.

68. **Araliaceae.** L. alternate, simple or compound. Fl. regular, usually pentamerous and umbellate. Calyx adnate to ovary, usually entire, petals caducous. Stamens inserted outside the epigynous disk, anthers didymous.

69. **Cornaceae.** L. entire, stipules 0. Fl. regular, calyx-tube adnate to ovary, limb persistent, segments small, petals 4 or 5, inserted with stamens round an epigynous disk. Fr. drupaceous.

ii. Gamopetalae.

70. **Caprifoliaceae.** L. opposite, stipules usually 0. Fl. bisexual, calyx-tube adnate to ovary, limb 3-5-toothed, corolla often zygomorphic, lobes 5. Stamens inserted on the corolla-tube.

71. **Rubiaceae.** L. opposite, sometimes whorled, stipules as a rule interpetiolar. Fl. as a rule bisexual and regular, calyx-tube adnate to ovary, corolla inserted round the epigynous disk, stamens inserted on the corolla-tube, alternating with its lobes. Ovary as a rule 2-celled.

72. **Valerianaceae.** Herbs or shrubs. Leaves opposite, exstipulate. Flowers sessile, cymose, sometimes polygamous or dioecious, bracteate. Stamens 1-4, on the corolla-tube. Fruit indehiscent, dry, 1-seeded. Seed pendulous.

73. **Dipsaceae.** Herbs or rarely shrubs. Leaves opposite or whorled, exstipulate, sometimes connate at the base, entire, toothed. Flowers scattered in cymes, whorled in spikes. Stamens 4 or 2. Seed pendulous, albumen copious.

74. **Compositae.** L. as a rule alternate, stipules 0. Inflorescence a dense head of many small fl., sessile on a broad receptacle and enclosed in an involucre of whorled or imbricate bracts. Calyx usually a pappus of hairs on the top of the ovary, stamens on the corolla-tube, anthers usually connate, connective produced upwards.

75. **Campanulaceæ.** Herbs or undershrubs, sometimes twining. Leaves alternate or opposite, entire, toothed or rarely lobed; stipules 0. Inflorescence axillary or terminal. Stamens 4-6, alternating with the corolla-lobes. Fruit capsular. Seeds very many.

76. **Vacciniaceæ.** Shrub or small trees. Leaves alternate or falsely whorled, entire or serrate; stipules 0. Flowers racemose or axillary and solitary. Stamens 10. Fruit a berry, rarely dry, 5-or falsely 10-celled. Seeds many, albuminous.

77. **Ericaceæ.** L. alternate, simple, stipules 0. Fl. bisexual, 4-or 5-merous, stamens as a rule twice the number of corolla-lobes, anther-cells opening at the top by pores or short slits. Ovary inferior or superior, 4-5-or many-celled, ovules numerous on an axile placenta.

78. **Plumbaginaceæ.** Herbs or undershrubs. Flowers in terminal scapes or peduncles, capitate, racemed or paniced. Petals 5. Stamens 5, opposite the petals, filaments rarely united into a linear tube. Stamens 5, opposite the petals. Capsule membranous.

79. **Primulaceæ.** Perennial, rarely annual herbs. Leaves all radical, or if cauline opposite, alternate or whorled, exstipulate. Flowers hermaphrodite, regular. Stamens on the corolla-tube, opposite its lobes. Capsule dehiscent transversely or by valves. Seeds minute, usually angular.

80. **Myrsinaceæ.** L. alternate, simple, gland-dotted, stipules 0. Calyx persistent, often enlarged in fr. Corolla-tube short or none, stamens opposite the corolla-segments. Ovary 1-celled, ovules on a free central placenta.

81. **Sapotaceæ.** L. entire, usually alternate and coriaceous. Fl. bisexual, calyx persistent, segments 1-8, almost distinct, corolla-tube short, lobes 4-24. Fr. a 1-8-seeded berry, seeds oily, with a crustaceous shining testa.

82. **Ebenaceæ.** L. entire, as a rule alternate, stipules 0. Fl. regular, usually dioecious, calyx gamosepalous, persistent and generally enlarged in fr.; segments 3-6, corolla-segments 3-6, stamens usually twice the number of corolla-lobes, filaments variously connate at base, often in pairs, anthers basifixed. Rind of fr. coriaceous, seeds embedded in soft or viscid pulp.

83. **Styraceæ.** L. alternate, stip. 0. Fl. bisexual, regular, 4-5-merous, calyx superior or inferior, limb persistent, petals free or connate, stamens 10 or numerous. Ovary 2-5-celled, ovules 1 or few on the inner angle.

84. **Oleaceæ.** L. as a rule opposite, stip. 0. Fl. regular, as a rule bisexual, in trichotomous panicles, calyx small, often truncate. Stamens 2, filaments usually short, ovary free, 2-celled, ovules 1 or 2 in each cell.

85. **Apocynaceæ.** L. entire, as a rule opposite or whorled, stipules 0 or small, sometimes intrapetiolar. Fl. regular, bisexual, usually pentamerous. Calyx free, corolla-lobes spreading, mostly contorted in bud, stamens 5, inserted in the corolla-tube. Carpels 2, usually distinct. Seeds often with a tuft of hairs. Endosperm scanty.

86. **Asclepiadaceæ.** L. entire, as a rule opposite, stipules 0. Fl. regular, bisexual, pentamerous. Calyx inferior, sepals imbricate in bud. Stamens 5, inserted on the base of the corolla, anthers cohering or connate, enclosing the stigma, pollen-grains as a rule united into waxy masses. Corona corolline or staminal. Carpels 2, distinct. Seeds usually winged and surmounted by a dense brush of hairs. Embryo large, in copious endosperm.

87. **Loganiaceæ.** L. opposite, simple, generally connected by interpetiolar stipules or by a raised line. Fl. regular, usually bisexual, ovary free, 2-celled. Embryo straight, in copious endosperm.

88. **Gentianaceæ.** Herbs, rarely minutely hairy. Leaves opposite, rarely alternate, entire, or alternate and 3-foliate in Menyanthes. Fl. cymose, capitate or umbelled, rarely solitary, regular. Stamens on the corolla-tube, as many as its lobes; filaments linear. Capsule membranous, rarely fleshy and berried. Seeds numerous, small.

89. **Polemoniaceæ.** Herbs, shrubs, or trees. Leaves exstipulate. Flowers showy, regular, hermaphrodite, 5-merous. Calyx inferior. Stamens 5, on the corolla-tube, alternate with its lobes. Capsule septicidal, 3-valved. Seeds many, aluminous; embryo straight.

90. **Hydrophyllaceæ.** Herbs, rarely shrubs, usually hairy, sometimes glandular hairy. Leaves simple or compound, exstipulate, usually alternate, rarely opposite. Flowers bisexual, regular, usually 5-merous. Fruit usually a loculicidal capsule. Seeds minute, embryo small.

91. **Boraginaceæ.** L. as a rule alternate and simple, stipules 0. Fl. bisexual, as a rule regular and pentamerous, in unilateral spikes or racemes, calyx free, persistent, lobes valvate in bud. Ovary superior, cells 2, each with 2 ovules, or 4, each with one ovule. Fr. a drupe or consisting of 4 nutlets.

92. **Convolvulaceæ.** L. alternate, stipules 0. Fl. large, bisexual, regular, pentamerous, sepals distinct, persistent. Fr. a berry or capsule, seeds 2-4.

93. **Solanaceæ.** L. as a rule alternate, stipules 0. Fl. regular, pentamerous, calyx usually gamosepalous, ovary free. Fr. a berry or capsule, seeds numerous.

94. **Scrophulariaceæ.** L. usually opposite, stip. 0. Fl. usually bisexual, corolla bilabiate, stamens 4, didynamous. Fr. a capsule, seeds numerous.

95. **Lentibulariaceæ.** Herbs, aquatic or in wet places. Leaves radical, rosulate, or capillary multifid or obsolete. Flowers hermaphrodite, purple, yellow, or white. Stamens 2, attached to the base of the corolla. Capsule globose, 2-4 valved. Seeds numerous, small.

96. **Gesneraceæ.** Herbs or undershrubs. Leaves opposite, alternate or solitary, undivided, entire or toothed; stipules 0. Flowers hermaphrodite, rarely regular. Fruit capsular or berried, dehiscent or indehiscent. Seeds very many.

97. **Bignoniaceæ.** L. usually opposite, compound, leaflet-opposite, stip. 0. Fl. bisexual, generally zygomorphic, calyx gamosepalous, truncate, split or toothed. Ovary free, supported by an annular disk. Fr. often elongated, generally dehiscent, the two valves separating from the dissepiment, to which numerous seeds are attached.

98. **Pedaliaceæ.** Herbs or undershrubs. Leaves opposite, or the upper alternate, entire, toothed or divided. Flowers irregular, axillary, solitary or rarely clustered. Stamens 4, didynamous; rarely 2. Capsule 2 or 3-4-celled. Seeds wingless, exalbuminous.

99. **Acanthaceæ.** L. opposite, stip. 0. Fl. bisexual, mostly irregular. Ovary free, 2-celled, style filiform, bifid, one branch often obsolete. Capsule loculicidal, seeds seated on hard curved acute supports.

100. **Verbenaceæ.** L. usually opposite or whorled, stip. 0. Fl. bisexual or by abortion polygamous, usually zygomorphic. Calyx as a rule gamosepalous and persistent, lobes imbricate, stamens usually 1, ovary 2-or 4-celled, 1 ovule in each cell.

101. **Labiataæ.** Mostly aromatic, branches usually 4-sided, L. opposite or whorled, stip. 0. Fl. zygomorphic, calyx persistent, corolla usually 2-lipped, lobes imbricate in bud. Stamens didynamous, the 2 upper sometimes imperfect or wanting. Ovary free, usually 4-lobed, supported by the annular disk. Fr. of 4 one-seeded nutlets.

102. **Plantaginaceæ.** Scapigerous herbs. Leaves usually radical. Flowers small, greenish, spicate, often dimorphic. Stamens 4, inserted on the corolla-tube; filaments capillary. Capsule 1-4-celled. Seed usually peltate, testa thin.

iii. Apetalæ.

103. **Nyctaginaceæ.** L. as a rule entire and opposite, stip. 0. Fl. usually bisexual, often involucrate, perianth small, petaloid. Ovary free, 1-celled, ovule 1. Fr. indehiscent, enclosed in the persistent perianth-tube.

104. **Amarantaceæ.** Stip. 0. Fl. usually bisexual, perianth of 5 persistent sepals, imbricate in bud. Stamens opposite the sepals, ovary free, 1-celled. Seed one, embryo horseshoe-shaped or annular, surrounding a mealy endosperm.

105. **Chenopodiaceæ.** L. alternate, rarely opposite, simple, stip. 0. Fl. small, perianth of 3-5 sepals, stamens opposite the sepals. Fr. generally enclosed in the perianth, seed one, embryo curved, annular or spiral.

106. **Phytolaccaceæ.** Glabrous trees, shrubs or herbs. Leaves alternate, quite entire, stipules small or 0. Flowers racemed, bracteate and 2-bracteolate. Stamens 4, alternate with the petals. Carpels 1 or more, superior, free or connate. Seeds erect, often arillate.

107. **Polygonaceæ.** L. alternate, simple, stipules scarious or membranous, usually sheathing. Fl. small, usually bisexual, perianth of 4-6 persistent segments, imbricate in bud, stamens opposite the segments. Ovary free, 1-celled, compressed or trigonous. Fr. a small hard nut, seed one.

108. **Podostemonaceæ.** Aquatics, growing on stones in tropical streams, annual or perennial. Flowers 1-sexual, rarely dioecious, usually enclosed in a spathe. Stamens definite or not, free or connate. Capsule 1-3-celled. Seeds minute; embryo straight.

109. **Nepenthaceæ.** Climbing or prostrate evergreen undershrubs. Leaves alternate, exstipulate, midrib stout. Stamens 4-16, united in a column crowned by the usually connate anthers with extrorse dehiscence. Capsule coriaceous. Seeds very numerous.

110. **Cytinaceæ.** Leafless brown reddish or yellowish parasites, or with leaves reduced to scales. Flowers solitary. Stamens 8 or more. Ovary 1-celled. Fruit fleshy, 1-celled. Seeds innumerable, very minute.

111. **Aristolochiaceæ.** L. alternate, stip. 0. Fl. bisexual, perianth campanulate or tubular, 3-lobed or 2-lipped, ovary inferior, placentas parietal, ovules numerous.

112. **Piperaceæ.** L. alternate, entire, basal nerves 3 or more, stipules membranous, enclosing the buds. Fl. usually dioecious or polygamous, in catkinlike spikes, perianth 0, stamens 1-4, hypogynous. Berry 1-celled, seed globose.

113. **Chloranthaceæ.** Herbs, shrubs or trees, usually aromatic. Leaves opposite, usually toothed, petioles often connate and forming a sheath. Flowers in terminal or pseudo-axillary spikes, heads or panicles, 1-sexual. Stamens 1 or 3 connate. Ovary 1-celled. Seed pendulous, testa membranous.

114. **Myristicaceæ.** Aromatic. L. entire, penninerved, stip. 0. Fl. 1-sexual, perianth as a rule 3-lobed, valvate in bud, anthers 6-30, usually sessile, ovary free, ovule 1, erect. Seed arillate, endosperm oily, ruminant.

115. **Lauraceæ.** Aromatic. L. as a rule entire and evergreen, stip. 0. Perianth regular, deeply 6-cleft, segments biseriate, tube often enlarged in fr., stamens perigynous, normally 12 in 4 circles, those of the innermost circle often wanting, those of the two outermost circles opposite to perianth-segments, anther-cells 2 or 4, opening by valves. Ovary free, 1-celled. Fr. a berry or drupe, seed one, cotyledons thick, oily.

116. **Hernandiaceæ.** L. alternate, stip. 0. Perianth of 4-10 segments, stamens 3-5, anther-cells 2, opening by valves.

117. **Proteaceæ.** L. hard, mostly alternate, stip. 0. Fl. bisexual, perianth of 4 segments, in bud valvately cohering into a cylindrical tube, tips free, recurved. Stamens 4, filaments inserted on perianth-segments. Ovary free, 1-celled. Seeds few.

118. **Thymelæaceæ.** L. simple, quite entire. Fl. usually bisexual, perianth tubular or campanulate, lobes 4 or 5, imbricate in bud. Stamens inserted on the perianth, usually twice the number of lobes. Ovary free, usually 1-celled.

119. **Elæagnaceæ.** Often spinescent, with silvery or brown stellate scales or hairs. L. alternate, quite entire, stip. 0. Fr. indehiscent, entirely enclosed within the lower fleshy part of perianth, seed 1, radicle inferior.

120. **Loranthaceæ.** Parasitic on stems and branches. L. entire, usually opposite, sometimes wanting. Fl. regular, perianth simple or double, stamens equal to and opposite

the petals or perianth-lobes. Ovary inferior, 1-celled, ovule 1, adnate all round to the ovary walls. Fr. usually viscid.

121. **Santalaceæ**. Mostly root-parasites. L. entire, stip. 0. Perianth usually adnate to ovary, 5-8-lobed, stamens opposite to lobes, ovary 1-celled, ovules several. Drupe or nut 1-seeded.

122. **Balanophoraceæ**. Flowers monœcious or diœcious, small or minute, crowded on spadix-like peduncled heads or cones. Stamens 1-2 in the naked flowers; in the flowers with a perianth as many as its lobes and opposite them or more, filaments 0. Fruit minute, crustaceous or coriaceous, 1-seeded. Seed usually adherent to the pericarp.

123. **Euphorbiaceæ**. L. in most genera alternate, undivided and stipulate. Fl. as a rule unisexual. Perianth calycine, several genera with petals. Ovary superior, as a rule of 3 carpels, more or less united, styles 3, ovules 1 or 2 in each cell, pendulous from the inner angle.

124. **Ulmaceæ**. L. distichous, undivided, stipulate. Perianth 4-9-lobed or of 4-5 sepals, stamens opposite to perianth-segments, rarely twice their number. Ovary of 2 carpels, usually 1-celled, ovule 1, pendulous.

125. **Moraceæ**. L. usually alternate, stipules large, often amplexicaul. Fl. unisexual, crowded on receptacles, which are globose, cylindric or hollow. Female flowers-perianth of 4 sepals or segments, often fleshy in fr. Ovary 1-celled, ovule 1, usually pendulous.

126. **Urticaceæ**. L. alternate, stipulate, as a rule dentate, basal n. 3. Fl. unisexual, sessile, usually in compact heads or clusters, stamens 4 or 5, opposite to perianth-segments, filaments inflexed in bud. Ovule erect, orthotropous.

127. **Juglandaceæ**. L. alternate, pinnate, stip. 0. Fl. monœcious; male flowers in lateral pendulous catkins. Female flowers in few- or many-fl. spikes, perianth adnate to the 1-celled ovary, ovule 1, erect. Cotyledons oily, endosperm 0.

128. **Myricaceæ**. Aromatic. L. alternate, coriaceous, stipules 0. Fl. unisexual, in catkins, stamens 3-6 in the axils of broad bracts. Fr. fleshy, endocarp bony, seed 1, endosperm 0.

129. **Fagaceæ**. L. alternate, simple, penninerved, stip. deciduous. Fl. monœcious, male flowers in drooping catkins or in erect spikes, anther-cells not distinct. Female flowers in spikes, each fl. or group of fl. enclosed in an involucre of numerous bracts, coalescing in fr., perianth adnate to ovary. Ovary 2-6-celled, 2 pendulous ovules in each cell.

130. **Betulaceæ.** L. alternate, undivided, as a rule serrate, stipules deciduous. Fl. early in spring, male fl. in drooping catkins, anther-cells as a rule distinct, female fl. in spikes, ovary 2-celled, 1 pendulous ovule in each cell, style 2, long, filiform, perianth 0 or adnate to ovary.

131. **Salicaceæ.** L. deciduous, alternate, simple, stipulate. Fl. dioecious, in catkins similar in both sexes, 1 fl. in the axil of each bract, a disk at the base of stamens and ovary, perianth 0. Ovary 1-celled, ovules many on 2-4 parietal placentas. Seeds many, minute, enclosed by long silky, deciduous hairs.

b. Gymnosperms.

132. **Gnetaceæ.** Stem and branches jointed at the nodes. L. opposite or reduced to a short sometimes 3-4-dentate sheath. Fl. unisexual, ♀ one erect ovule, integument single, prolonged into a tube. ♂ Ovule enclosed in a perianth, which usually becomes fleshy in fr.

133. **Taxaceæ.** L. mostly narrow, linear or lanceolate. Fl. mostly dioecious. Carpels usually few or even 1 terminal, with 1-2 ovules each.

134. **Pinaceæ.** L. usually needle-like or scaly. Fl. mostly monœcious. Male flowers in deciduous catkin consisting of numerous sporophylls which are usually scale-like. Female flowers in cones consisting of scale-like open carpels which are flat or peltate.

135. **Cycadaceæ.** Trunk cylindric, sometimes branched, with terminal tufts of rigid, pinnate leaves, pith and bark large. Fl. dioecious, at the apex of trunk among the leaves, male fl. in erect cones with numerous thick scales, bearing on the under-surface many globose anther-cells. Female fl. carpophylls densely woolly in crowded whorls around the top of trunk, each with 1-5 pairs of ovules on its edge.

GLOSSARY

OF

BOTANIC TERMS.

A

Abortion, imperfect development or ~~non~~-development of an organ;
abortive, obsolete; imperfectly developed.

Accrescent, increasing in size with age; usually said of parts of the calyx or corolla that persist and enlarge after flowering.

Achene, a small dry indehiscent 1-celled 1-seeded fruit or a 1-seeded indehiscent carpel of an apocarpous fruit.

Acicular, needle-shaped; long and slender.

Acorn, fruit of the oak. *i.e.*, a nut enclosed within a cup formed of an involucre of thickened bracts.

Actinomorphic, divisible into similar halves by two or more planes; said of flowers.

Aculeate, abounding with prickles.

Acumen, a sharp tapering point more or less prolonged.

Acuminate, terminating in an acumen.

Acute, evenly tapering and ending in a narrow angle, but without a prolongation.

Adnate, said of dissimilar organs when congenitally united.

Adpressed, lying close throughout the entire length against the surface.

Adventitious, occurring in an unusual position; usually applied to buds and roots.

Æstivation, the mode in which the parts of a flower are folded in the bud, also their relative position.

Albumen, the nutritive substance found within the seed coats of some seeds outside the embryo.

Amplexicaul, said of a sessile leaf or the base of a petiole when clasping the stem.

Anastomosing, reticulately united.

Anatropous, said of an inverted ovule, *i.e.*, one with the micropyle close to the hilum, and the chalaza at the opposite end, the axis of the ovule itself remaining straight.

Androphore, the tube or column on which some stamens are supported.

Androecium, the male organs of a flower collectively.

Androgynous, said of an inflorescence bearing both male and female flowers.

Angiosperm, a subphylum (which includes the two classes Monocotyledons and Dicotyledons) in which the ovules are enclosed in the ovary and are fertilized through the stigma.

Annulate, marked transversely by rings.

Anterior, said of that part of a flower which faces outwards from the axis of inflorescence; inferior.

Anther, the part of a stamen that bears the pollen.

Antipetalous, inserted opposite the petals.

Apetalous, without petals.

Apiculate, with a short pointed tip.

Arborescent, tree-like, growing to the size of a tree.

Apocarpous, with the carpels free and distinct.

Arcuate, shaped like a bow, *i.e.*, moderately curved.

Areola, a small space with clearly defined outline *e.g.*, the spaces between the reticulating veinlets of a leaf.

Aril, **arillus**, an accessory seed-covering or an appendage growing from or about the hilum of a seed. **Arillate**, having an aril.

Arillode, a false aril growing from the micropylar end.

Aristate, bearing an awn, or bristle *e.g.*, glumes of some grasses.

Articulate, jointed in such a manner as to separate at maturity.

Ascidium, a pitcher-like cavity formed by a modification of the leaf stalk or blade.

Ascending, directed obliquely upward.

Attenuate, narrow and gradually tapering.

Auricle, an appendage like the lobe of an ear. **Auriculate**, **auricled**; having an auricle.

Awn, a bristle-like appendage, especially of the glumes of grasses.

Axil, the upper angle formed by a leaf or a similar organ and the supporting stem or axis. **Axillary**, relating to the axil.

Axile, relating to the axis; generally said of a kind of placentation in which the ovules are borne on the axis at the inner angles of the cells of a syncarpous ovary.

Axis, the central line or support round or on which parts of an organ are arranged.

B

Baccate, berry-like, pulpy.

Basifixed, fixed by the base, especially said of an anther attached at its lower end to the top of the filament; innate. **Basal**, **basilar** attached to the base.

Bast, fibrous inner bark.

Beak, a sharp tip like the bill of a bird.

Berry, a simple fruit succulent throughout, without a stone, and generally with more than one seed.

Bifarious, in two opposite vertical rows.

Bifid, divided into two segments with a narrow sinus.

Bifurcate, two-forked, having two prongs or branches.

Bilabiate, having two lips, a term usually applied to gamosepalous calyces and gamopetalous corollas.

Bipinnate, twice pinnate.

Biseriate, in two series or rows, generally one above or within the other.

Bisexual, having both stamens and pistil in the same flower; hermaphrodite.

Biternate, twice ternate.

Blade, the expanded portion of a leaf or a clawed petal.

Bole, the main axis or trunk of a tree.

Brachiate, widely spreading, a term applied to branches.

Bract, a rudimentary or modified leaf subtending a flower or an inflorescence. **Bracteate**, having bracts.

Bracteole, a secondary bract or one of the ultimate grade subtending each flower of an inflorescence. **Bracteolate**, having bracteoles.

Bulb, a short, usually underground stem, consisting of a short axis, bearing a bud or buds enclosed in fleshy scales or coats.

Bulbiform, formed like a bulb. **Bulbous**, of the nature of bulbs. **Bulbil**, small axillary bulbs.

Buttressed, said of stems with vertical ridges or projections.

C

Caducous, falling off very early.

Cæspitose, tufted or growing in tufts, e.g., many species of bamboos.

Callus, the new tissue which forms over the wounds of plants.

Calyx, the outer whorl of floral leaves, immediately below or outside the corolla. **Calycine**, relating to the calyx.

Calyptra, a cap or hood. **Calyptrate**, hooded.

Cambiumlayer, a zone of tender thin-walled cells separating the wood from the bark in Dicotyledons and Gymnosperms, by the division and growth of which new wood and bark are formed.

Campanulate, bell-shaped—deeper than cupshaped.

Canescent, with very short grey hairs or pubescence giving the epidermis a greyish white hue.

Capillary, slender, hairy or thread-like.

Capitate, having a globose head.

Capitulum, a globose head or cluster or sessile or shortly pedicellate flowers.

Capsule, a dry syncarpous fruit, which opens at maturity to discharge the seed.

Carpel, one of the component parts of a syncarpous or apocarpous pistil. **Carpellary**, relating to a carpel.

Carpophore, the part of the axis of a flower situated between or above the Carpels, and to which the Carpels are attached.

Caruncle, a wart-like appendage, produced at the base of a seed.

Cartilaginous, firm and tough, like parchment.

Caryopsis, a grain; the seed-like fruit of Gramineæ with thin pericarp, which is usually adnate to the contained seed.

Catkin, a scaly spike or raceme of unisexual flowers, pendulous or drooping, and generally deciduous.

Caudate, furnished with a tail, or with a slender tail-like terminal appendage.

Cauline, pertaining to the stem.

Cell, the living vegetable unit; the structural unit in the formation of a plant. Also one of the cavities of an ovary or of an anther.

Chalaza, that part of the ovule where the base of the nucellus is confluent with the coats of the ovule.

Chartaceous, having the texture of writing paper, thin and flexible.

Cilia, marginal hairs forming a fringe like eye-lashes.

Ciliate, having cilia; dim. **ciliolate**.

Circinate, coiled inwards from the tip.

Cirrhose, **cirrose**, bearing tendrils.

Circumsciss, dividing or opening circularly or transversely.

Cladode, a branch more or less flattened which assumes the form and functions of a leaf.

Clavate, club-shaped, slender below and gradually thickened upwards.

Claw, the narrowed base of certain petals.

Cocci, pl. of **coccus**, the seed-like dehiscent or indehiscent segments of the dry fruit which separate at maturity.

Cogener, one of the same genus.

Coherent, similar parts united together but separable without rupture.

Collateral, side by side.

Coma, a tuft of soft hairs or cotton borne on a seed. **Comose**, having a coma.

Commissure, the union line between two parts.

Concolor, **Concolorus**, of the same colour throughout.

Confluent, blending together.

Conduplicate, folded once upon itself lengthwise.

Conc, the multiple fruit of Conifers forms mostly of imbricated scales by which the seeds are subtended.

Connate, said of similar organs or parts of the same organ when congenitally united.

Connective, the portion of a stamen that connects the two lobes or cells of an anther.

Connivent, **conniving**, said of sepals, petals or anthers having the apex arching over or converging in the centre of the flower.

Contorted, **convolute**, twisted in one direction upon itself; said of leaves or petals in a bud with one margin within and the other outside the whorl.

Convergent, said of lateral nerves of leaves curved from base to apex.

Cordate, heart-shaped; when applied to the base of a leaf or other organ—with two broad rounded lobes on either side of the axis.

Coriaceous, leathery, tough and thick.

Corm, a solid fleshy underground stem more or less jointed and naked or with thin scales, such as is characteristic of certain families, e.g., Aroideæ.

Corolla, the inner whorl of floral leaves.

Corona, a whorl of process from the corolla, or from stamens in some families like *Asclepiadaceæ*.

Cortical, relating to the cortex or bark.

Corymb, an inflorescence of the indefinite or centripetal kind in which the lower branches or pedicels, are longer than the upper, and thus although starting from different points, all attain almost the same level.

Costate, furnished with one or more primary ribs or veins.

Cotyledons, the seed lobes or first leaves of an embryo.

Crateriform, shaped like a shallow cup.

Crenate, with rounded teeth.

Crustaceous, hard and brittle; said of a covering which splits and breaks off easily.

Cruciform, in the form of a cross; generally said of flowers with four petals arranged crosswise.

Culm, the hollow and jointed stem of grasses, especially of bamboos.

Cuneate, wedge-shaped, acute angled at the base.

Cupula, cupule, a cup-like involucre of thickened bracts supporting the nut of the oak.

Cupular, cup-shaped.

Cusp, a long and tapering rigid point. **Cuspidate**, furnished with a cusp.

Cuticle, the outermost layer of the epidermis.

Cyathiform, wine-cup shaped.

Cyme, an inflorescence of the definite or centrifugal type in which the main axis and all the lateral axis are each terminated by a flower so that flowering proceeds from the centre outwards.

Cypsela, a dry inferior achene invested with the adnate calyx: the fruit of *Compositæ*.

Cystolith, a crystalline concretion usually of calcium carbonate in the cells of some plants.

D

Decandrous, with ten stamens.

Deciduous, said of trees or shrubs which are leafless for a part of the year; also of leaf or parts of a flower which fall off normally.

Declinate, bent to one side.

Decomound, compound or divided more than once.

Decumbent, inclined downwards but with the tip ascending.

Decurrent, produced down, as a sessile leaf when the blade is prolonged below the insertion along the stem forming a winged appendage.

Decurved, bent or directed outwards.

Decussate, in pairs alternately crossing at right angles.

Deflexed, bent downward.

Dehiscence, the mode of opening of a capsule or of an anther.

Deltoid, triangular in outline or in section.

Dentate, with margins cut into triangular salient teeth directed outward. **Denticulate**, minutely toothed.

- Dextrorse**, turning or twining from left to right, *i.e.*, in the anti-clockwise direction.
- Di, Dis** (prefix), two, twice, double.
- Diadelphous**, said of stamens united by their filaments into two sets of bundles.
- Dichasium**, a falsely dichotomous cyme of which the main axis ends in a flower and branches below the latter into two lateral axes of almost equal strength.
- Diclinous**, having the stamens in one flower and the pistil in the other.
- Didymous**, slightly 2 lobed or occuring in pairs.
- Didynamous**, said of a flower with two long and two short stamens, and also of stamens when they are such.
- Diffuse**, widely spreading;—stems, procumbent and also very much loosely branched.
- Digitate**, finger-like; said of a compound leaf with the leaflets all borne on the apex of the common petiole.
- Dimorphic, dimorphous**, having two forms, generally said of hermaphrodite flowers having one form with long styles and short stamens, and another with short styles and long stamens.
- Diœcious**, unisexual with the male and female flowers on separate individuals.
- Disk, Disc**, an enlargement of the receptacle of a flower in the form of a cup or of a cushion, ring or glands. **Discoid, disciform**, disk-like; circular and flat. **Disc-florets**, those borne on the central portion of a capitulum.
- Dissepiment**, a partition in an ovary or pericarp in the direction of its length.
- Distal**, furthest from the base.
- Distichous**, arranged in two opposite vertical rows.
- Divaricate**, spreading widely apart.
- Dorsal**, relating to, or inserted on, the back.
- Dorsifixed**, said of an anther attached to the top of the filament by a part not the whole of the back.
- Drupe**, a stone fruit, *i.e.*, one with a fleshy or pulpy pericarp and a bony or crustaceous endocarp. **Drupaceous**, like a drupe.
- Drupelet**, drupel, a diminutive drupe.

E

- E, Ex** (prefix), without or out of.
- Ebracteate**, without bracts. **Ebracteolate**, without bracteoles.
- Echinate**, set all round with sharp bristles like a hedge hog.
- Effuse**, very widely spreading.
- Elliptic, elliptical**, oblong with rounded ends. **Ellipsoid**, a solid with an elliptical outline.
- Emarginate**, with a notch at the apex.
- Embryo**, the rudimentary plantlet formed in a seed.
- Endocarp**, the inner layer of the pericarp.

Endosperm, the albumen of a seed.

Ensiform, in the shape of a sword.

Epi- (prefix) upon.

Epicalyx, a whorl of bracts below the calyx proper and somewhat resembling it in shape and colour.

Epicarp, the outer layer of a pericarp.

Epidermis, the outermost layer of tissue or skin of a plant.

Epigynous, inserted on the top of the ovary.

Epipetalous, said of stamens which are borne on, or adnate to the petals or corolla.

Epiphyllous, growing on leaves or perianths.

Epiphyte, a plant growing on, but not nourished by another plant.

Epiphytic, having the habit of an epiphyte.

Equitant, said of two ranked leaves, or leaves in bud, when folded lengthwise, the outer ones at their base folding over the inner.

Erose, with an irregularly toothed margin.

Exalbuminous, without albumen.

Excavate, hollowed into broad deep pits.

Exocarp, the external layer of the pericarp when an endocarp is present.

Exserted, projecting outwards as anthers beyond the corolla.

Exstipulate, without stipules.

Extra-axillary, growing outside the axil, *i.e.*, above, below or one side of it.

Extrorse, applied to anthers that dehisce outwards, *i.e.*, away from the axis of the flower.

F

Falcate, curved like the blade of a sickle or scythe.

Family, a group of co-related genera.

Farina, starch or anything resembling it or analogous to it.

Farinaceous, consisting of or resembling starch.

Fascicled, fasciculate, in dense clusters.

Fastigate, said of branches which are nearly parallel and point upwards.

Ferruginous, coloured like iron rust.

Fibro-vascular, said of a tissue consisting of woody fibres and ducts or vessels.

Filament, the stock of an anther.

Filiform, thread-like.

Fimbriate, having a fringe or border of fine thread-like processes.

Fistular, hollow tubular.

Flabellate, fan-shaped.

Flaccid, soft, flabby, wanting in stiffness.

Floccose, woolly with locks of dense soft hairs that are easily detached.

Foliaceous, of the form or texture of a leaf.

Follicle, a dry fruit resulting from a single carpel opening by only

one usually the inner suture. **Follicular**, pertaining to or resembling a follicle.

Foramen, the minute aperture in the coats of an ovule corresponding to the micropyle of a seed.

Free, distinct, not adnate to any other organ. **Free central**, said of the placenta of an one-celled ovary when it forms a central ovule bearing column arising from the base.

Fugacious, falling off or fading very early.

Fulvous, tawny.

Funicle, the stalk of an ovule or seed.

Furcate, forked.

Fuscous, brown or greyish brown.

Fusiform, spindle-shaped; solid and tapering at both ends.

G

Gamopetalous, having combined petals.

Gamophyllous, said of a flower having a perianth of united leaves or segments; also applied to such a perianth.

Gamosepalous, having combined sepals.

Geminate, growing in pairs.

Geniculate, bent abruptly.

Genus, pl. genera, a group of closely related species indicated by the first name of a plant.

Gibbous, having a pouch-like swelling or protuberance on one side.

Glabrous, without hairs of any kind. **Glabrate**, somewhat glabrous.

Glabrescent, becoming glabrous.

Glands, small wart-like bodies or round excrescences of any kind found on stems, petioles, etc., or inside flowers. Small raised superficial dots, or minute vesicles imbedded in the substance of leaves, etc., usually filled with oil. **Glandular**, having glands or relating to glands.

Glaucous, of a bluish-grey colour, often covered with a fine bloom.

Globose, nearly spherical.

Glochidia, barbed bristles.

Glomerate, compactly clustered.

Glumes, the chaffy bract-like scales of the inflorescence of grasses and their allies. **Glumaceous**, resembling or relating to glumes.

Glutinous, sticky.

Gonophore, a stipe or stalk supporting both stamens and ovary in a flower.

Gymnosperm, with naked seeds, i.e., not enclosed in a seed-vessel: a group comprising the Fir, Gnetum and Cycas families, the naked seeds of which are fertilised by direct contact with the pollen; see angiosperm.

Gynobase, a short and broad elongation of the torus on which the pistil rests. **Gynobasic**, resting on a gynobase.

Gynophore, the stipe or stalk supporting an ovary.

H

- Hastate**, spear-head shaped, usually said of leaves with a pointed apex, and basal lobes directed outwards.
- Haustrorium**, pl. **haustoria**, a sucker at the end of a parasitic root; a root-like sucker.
- Head**, a form of inflorescence consisting of a more or less dense cluster of sessile flowers which are centripetal in evolution.
- Helicoid**, coiled in a spiral.
- Hermaphrodite**, bisexual; having both stamens and pistil in the same flower.
- Heter**, **hetero**, (prefix) different.
- Heterogamous**, said of flower heads when male, female, bisexual and neuter florets, or any two or three of these, are borne on the same head.
- Hilum**, the place of attachment of an ovule or seed to the placenta or funicle.
- Hirsute**, thickly covered with long and rather coarse hairs.
- Hispid**, beset with rigid or bristly hairs.
- Homogamous**, said of a flower head with the florets all of the same sex.
- Hyaline**, transparent or translucent and colourless.
- Hypanthium**, an enlargement of the torus of the flower under the calyx or perianth.
- Hypocrateriform**, salver-shaped; said of a corolla with a slender tube abruptly expanded into a flat horizontal limb.
- Hypogynous**, inserted below the ovary.

I

- Imbricate**, overlapping.
- Imparipinnate**, unequally pinnate; pinnate with a terminal leaflet or pinna.
- Impressed**, marked with small depressions, **nerves**, those slightly below the surface of the leaf.
- Incised**, cut sharply and irregularly.
- Included**, not protruding beyond the surrounding organs, usually said of stamens or styles that are not produced beyond the corolla.
- Incomplete**, said of a flower wanting calyx or corolla or both.
- Incumbent**, leaning upon.
- Indehiscent**, said of fruits the pericarp of which does not open to discharge the seeds.
- Indumentum**, a general term for any kind of hairy covering or coating.
- Induplicate**, with the margins folded inwards.
- Induplicate-valvate**, said of members of a whorl when they touch one another with margins of each folded inward.
- Indurated**, hardened.
- Inferior**, inserted below the ovary and free from it, if said of the

calyx: adnate to, or situated below the calyx, if said of the ovary; also anterior, when said of the relative position of the parts of a flower in an inflorescence.

Inflorescence, the mode in which flowers are arranged on the stem. Also used as a collective term for the whole flowering portion of the stem of a plant with its branches, bracts, bracteoles and flowers.

Infundibuliform, funnel-shaped.

Innate, said of an anther borne on the apex of the filament and with usually marginal dehiscence.

Innovation, a newly formed shoot.

Integuments, the coats of an ovule or seed.

Inter, (prefix) between.

Interpetiolar, said of stipules of opposite leaves when they are inserted between the petioles, *i.e.*, across the stem.

Intra, (prefix) within.

Intrapetiolar, is applied to stipules of single leaves when they are connate by their margins so as to form apparently one stipule.

Introrse, applied to anthers that dehisce or are turned towards the axis of the flower.

Intruded, projecting inward.

Involucre, a circle of bracts subtending a flower cluster.

Involute, rolled inward.

Irregular, wanting in symmetry of form, said of flowers with the petals or perianth segments unequal in size and shape.

Isomerous, having an equal number of members.

K

Keel, the central dorsal ridge, like the prow of a boat, formed by the two anterior and innermost petals of a Papilionaceous corolla.

Kernel, the contents of the putamen of a drupe.

L

Labiate, two-lipped.

Lacerate, irregularly cleft as if torn.

Laciniate, irregularly cut or fringed into narrow lobes or segments with narrow sinuses.

Lacunose, marked with minute pits or depressions.

Lamina, the blade of a leaf; the expanded portion of a clawed petal.

Lanate, woolly.

Lanceolate, shaped like a lance-head, *i.e.*, 2-4 times as long as broad, narrowed at both ends towards the apex, and broadest below the middle.

Latex, milky sap.

Lax, diffuse, said of an inflorescence when the flowers or fruits are not closely arranged on it.

Legume, a fruit of a single carpel usually opening by both sutures when ripe. See Pod.

- Lenticel**, a corky dot or protuberance on the bark. **Lentincellate**, having lenticels.
- Lenticular**, lentil shaped, *i.e.*, like a double convex lens.
- Lepidote**, scurfy with minute scales.
- Ligule**, anything shaped like a strap, such as the limb of the ray-corolla in some Compositæ; a thin and scarious projection from the summit of the sheath of the leaf of grasses; an outgrowth from the inner face of the base of some petals.
- Ligulate**, strap-shaped, usually applied to the ray-flowers of Compositæ.
- Limb**, the expanded part of a gamosepalous calyx or a gamopetalous corolla as distinguished from the tube; the blade of a clawed petal.
- Linear**, narrower than lanceolate, at least five times as long as broad.
- Lineolate**, marked with fine lines.
- Lip**, one of the two divisions of a bilabiate calyx or corolla.
- Littoral**, growing on or along the seashore.
- Lobulate**, divided into small lobes.
- Loculicidal**, applied to a kind of dehiscence of a capsular fruit in which splitting takes place through the cells.
- Locus**, the cell of an ovary; the sac or cell of an anther.
- Lodicule**, one of the small scales which represent the perianth in the flower of a grass, occurring usually in pairs.
- Lomentum**, a form of legume which breaks up at maturity into one-seeded indehiscent segments.
- Lyrate**, pinnately lobed with a large terminal lobe and one or more pairs of small basal lobes, so as to resemble a lyre.

M

- Macro**, large or long (prefix).
- Mamillate**, having nipple-like prominences.
- Marcascent**, withering without falling off like the petals of some flowers.
- Marginate**, having a border, with a distinctive texture.
- Median**, relating to the middle, in a plane radial to the axis of a plant.
- Medullary rays**, verticular plates of cellular tissue which radiate from the centre of a dicotyledonous plant towards the cambium.
- Membranous**, thin, pliable like a membrane.
- Meristem**, tissue of cells capable of reproducing themselves by division.
- Mesocarp**, the middle layer of the pericarp.
- Micro**, small (prefix).
- Micropyle**, the minute orifice in the coats of a seed represented by a scar; the opening through the coats of an ovule at the apex of the nucellus.
- Mon**, **mono**, single, alone (prefix).

Monadelphous, said of stamens united by their filaments into one bundle forming a tube or column or sheath.

Moniliform, cylindrical and constricted at regular intervals so as to resemble a necklace of beads.

Monœcious, unisexual with the male and female flowers on the same plant.

Monopodial, pertaining to or of the nature of a monopodium, *i.e.*, a simple axis prolonged by means of a terminal bud.

Mucro, a short straight stiff and sharp point.

Mucronate, abruptly terminating in a mucro.

Multi, many (prefix).

Multifarious, in many vertical rows.

Multifid, cleft into many lobes or segments.

Multiseriate, in many series or rows.

Muricate, rough with sharp straight points.

Muticous, blunt.

N

Needles, the acicular leaves of conifers.

Nerves, the principal lateral ribs of a leaf. **Nervose**, with strongly developed nerves.

Nodose, with swollen joints; knotty, chiefly said of roots.

Nucellus, the central part of an ovule containing the embryo sac.

Nucleus, the solid portion of a winged seed or fruit; a clearly defined and comparatively dense portion of the cytoplasm which controls all activities of the cell.

Nut, a hard indehiscent 1-seeded fruit resulting from a syncarpous ovary.

O

Ob, reversed or inverted (prefix).

Obconic, inversely conical, *i.e.*, with the attachment at the pointed end.

Obcordate, inversely cordate, *i.e.*, broadly two-lobed with a notch at the apex.

Obdiplostemonous, having twice as many stamens as petals in two series, the outer being opposite the petals.

Oblanceolate, inversely lanceolate, *i.e.*, long, narrow and tapering at both ends, but broadest above the middle. **Oblanceoloid**, said of a solid having an oblanceolate outline.

Oblique, one-half larger than the other, unequal-sided—nerves, those making acute angles with the midrib.

Oblong, much longer than broad with the sides nearly parallel.

Obovate, inversely ovate, *i.e.*, egg-shaped in outline with the broad end towards the apex.

Obovoid, said of a solid which is inversely egg-shaped in outline.

Obsolete, rudimentary, imperfectly developed.

Obtuse, blunt or rounded at the apex.

Ochrea, Ocrea, a membranous tubular stipule or a pair of membranous stipules forming a sheath round the stem.

Oid, (suffix) resembling.

Opérculum, a lid; a top which separates by a transverse line of separation.

Orbicular, orbiculate, flat with the outline circular or nearly so.

Order, a group of closely-related Families of plants.

Osseous, of bony texture.

Ovary, that portion of the pistil which includes one or more cavities or cells containing one or more ovules.

Ovate, egg-shaped in outline with the broad end towards the base.

Ovoid, said of a solid with an ovate or oval longitudinal section.

Ovule, the embryonic seed in the ovary.

P

Palea, or pale, a chaffy scale; the inner glume of the flower of a grass; the chaffy scales on the receptacles of many Compositæ.

Paleaceous, chaff-like.

Palmate, with the midribs of the lobes or leaflets all radiating from the apex of the petiole, the segments like the spread fingers of the hand.

Palmatifid, palmate with the sinuses reaching half way down.

Palmatilobed, palmately lobed.

Palmatisect, deeply cut in a palmate manner.

Palmatipartite, with the segments palmately cut almost to the base.

Palminerved, with nerves radiating like the ribs of a palmate leaf.

Pandurate, Panduriform, fiddle-shaped.

Panicle, a compound inflorescence in which the main axis is racemose and the secondary and tertiary ramifications are racemose or not.

Papilionaceous, butterfly-like; applied to the kind of corolla characteristic of Papilionaceæ (the Pea Tribe) of Leguminosæ. See *Keel, Wings & Standard*.

Papillose, bearing minute nipple-shaped projections.

Pappus, thistle-down, the hairy tufts on achenes and other fruits.

Paraboloidal, said of a solid having a parabolic, i.e., ovate-oblong outline.

Parasite, a plant that grows on or in another plant, and draws nourishment from it.

Parietal, said of placentas attached to the wall of a more than 1-carpelled ovary.

Paripinnate, Syn. **abruptly pinnate**, evenly pinnate; pinnate without the terminal leaflet or pinna.

Patent, widely spreading.

Pedate, Palmately divided with the lateral segments 2-cleft.

Pedicel, the ultimate stock supporting a single flower in an inflorescence. **Pedicellate**, having a pedicel.

Peduncle, the stalk supporting a solitary flower or fruit or a cluster of flowers or fruits. **Pedunculate**, having a peduncle.

Pellucid, transparent or translucent.

Peltate, shield-shaped; said of a flat body (e.g., a leaf) attached to the stalk by the lower surface and not by the margin or base.

Penicillate, bordered or tipped with brush-like hairs.

Penninerved, pinnately nerved; with nerves spreading laterally from various points on the midrib.

Penta, five (prefix).

Pentadelphous, said of stamens arranged in 5 bundles

Pentamerous, having the members in each whorl of the flower in fives.

Penultimate, next to the ultimate.

Perianth, a floral envelope; a term especially used when the calyx and corolla are similar in form and texture, or are represented by a single whorl.

Perfoliate, said of a sessile leaf the basal lobes of which pass round the stem and are connate on the other side of it.

Pericarp, the portion of the fruit formed of the ovary and whatever adheres to it, exclusive of, and outside, the seeds.

Perigynous, inserted around but away from the ovary; said of the sepals, petals and stamens of a flower when these are inserted on a tube formed by the torus (the calyx-tube) above the level of the base of the ovary.

Persistent, remaining attached, generally said of a calyx or a corolla which remains attached until the fruit is mature.

Perisperm, the outer endosperm of some seeds derived from the nucellus, e.g., Piperaceæ.

Perulate, wrapped in scales as many winter buds

Petal, one of the divisions of the corolla.

Petiole, the stalk of a leaf. **Petiolate**, having a petiole. **Petiolule**, the stalk of a leaflet. **Petiolulate**, having a petiolule.

Phloem, the soft tissue of the inner bark.

Phylloclade, **Phyllocladium**, a modified branch that resembles a leaf in form and function C[p. **Cladote**.

Phyllodium, a petiole having the form and function of leaves.

Pilose, thinly sprinkled with long soft simple hairs.

Pinna, pl. *pinnæ*, the primary division of a bipinnate or tripinnate leaf. **Pinnule**, the secondary division of a tripinnate leaf.

Pinnate, a compound leaf is so called when the leaflets are arranged on either side of a common axis.

Pinnatifid, deeply pinnately lobed to about half way down.

Pinnatisect, pinnately cut nearly to the common axis.

Pisiform, pea-shaped.

Pistil, the female organ of a flower consisting normally of ovary style and stigma. **Pistillode**, a rudimentary or barren pistil.

Placenta, that portion of the interior of an ovary on which the ovules are borne. **Placentation**, position of the placenta.

Plaited, plicate, folded in longitudinal plaits.

Plumose, feathered; branches on either side like the plume or webs on the shaft of a feather.

Pod, the same as legume, but has a wider application, being used to denote any dry dehiscent many-seeded fruit, especially when it is much longer than broad.

Pollen, minute powder-like grains contained in the anther cells, the fertilizing agent of a plant.

Poly, many (prefix).

Polyadelphous, having the stamens united by the filaments into many sets or bundles.

Polygamous, with hermaphrodite and unisexual flowers on one or different plants.

Polyphyllous, said of a perianth having distinct leaves or segments.

Pome, a succulent fruit with seeds in many cartilaginous dry cells. e.g., the apple and the pear.

Pore, a minute passage or orifice.

Posterior, said of that part of a flower which is nearest to the axis of inflorescence; superior.

Prickle, a sharply pointed stiff outgrowth of the epidermis.

Procumbent, } lying flat or close to the ground.

Prostrate,

Proximal, nearest the base or starting point.

Pruinose, covered with a whitish waxy bloom or powder.

Pseudo, **Pseudo**, false (prefix).

Pseudocarp, a false fruit; one which has some portion other than the ovary so developed as to resemble a fruit.

Pubescent, covered with short soft straight simple hairs.

Puberulous, puberulent, minutely pubescent.

Pulvinate, cushion-shaped.

Pulvinus, the swollen base of petioles or petiolules.

Punctate, dotted with small punctures or glands. **Punctulate**, minutely punctate.

Pungent, terminating in or tapering gradually to, a hard sharp point.

Pustular, with small blister-like elevations.

Putamen, the shell of a nut; the hard endocarp of a drupe.

Pyrene, one of the small stones of a drupaceous fruit having more than one stone.

Pyriform, pear-shaped; obovoid with a tapering base.

Q

Quadrangular, four-cornered.

Quadrate, square

Quinequefoliolate, with five leaflets

R

Raceme, an inflorescence of the indefinite kind in which the flowers are borne on pedicels of more or less the same length along a

- single undivided axis or rachis, the oldest flowers being lowermost.
- Rachis**, the principal axis of a pinnate leaf or of an inflorescence.
- Rachium**, **pl. rachilla**, the secondary rachis of a compound spike; the rachis of a spikelet of grass.
- Radical**, relating to or springing from the root.
- Radicle**, the axis of an embryo below the cotyledons.
- Raphe**, the cord or ridge formed by the funicle along the side of some ovules.
- Raphides**, needle-shaped crystals found in the cells of some plants.
- Ray**, one of the radiating branches of an umbel. **Ray-florets**, the flowers borne on the rim or circumference of the heads in Compositæ usually differing in structure from those of the disk.
- Receptacle**, the torus of a flower; hence also what is commonly known as the fruit of figs.
- Reflexed**, bent abruptly backward or downward.
- Regular**, symmetrical, generally said of flowers with the petals or perianth-segments alike in size and shape.
- Reniform**, kidney-shaped; i.e., broader than long, broadly cordate at the base, and with the auricles rounded.
- Repand**, having a wavy margin.
- Replum**, a septum joining the sutures of two carpels from which the carpels or valves finally separate, e.g., Cruciferae.
- Resupinate**, turned or twisted so that parts are eventually turned to the opposite direction from their normal position, generally spoken of flowers.
- Reticulate**, having the veins connected together like the meshes of a net.
- Retinaculum**, a persistent hook-like, upcurved and subsequently hardened process from the placenta in most Acanthaceæ on which the ovules and seeds are borne.
- Retorse**, directed backwards or downwards.
- Retuse**, with a small shallow notch in a rounded or truncate apex.
- Revolute**, having the margins or apex rolled backward upon the under-surface.
- Rhizome**, an underground or prostrate stem of root-like appearance which sends off roots at the nodes and bears, like a true stem, buds, leaves or scales.
- Rhomboid**, **rhomboidal**, with four sides more or less equal, and the lateral angles obtuse.
- Rostrate**, beaked, narrowed into a slender tip or process.
- Rotate**, wheel-shaped; said of a regular gamo-petalous corolla with a short tube and a flat spreading limb.
- Rotundate**, circular or nearly so in outline.
- Rufous**, reddish brown.
- Rugose**, full of wrinkles. **Rugulose**, minutely wrinkled.
- Ruminatè**, marked by transverse lines of divisions, said of albumen of some seeds, e.g., Anonaceæ.

Runcinate, toothed or incised with the teeth or segments pointed backwards.

Runner, a very slender prostrate branch arising from the base of a stem, rooting at the nodes or tip and sending up shoots which form new plants.

S

Saccate, bulged into a small bag or cavity.

Sacciform, in the form of a bag.

Sagittate, shaped like an arrow-head; tapering towards the apex, two lobed at the base with the lobes pointed and directed downwards.

Salver-shaped, with a long tube and horizontally spreading limb, C/p. *hypocrateriform*.

Samara, an indehiscent dry fruit with a wing developed from the pericarp.

Saprophyte, a plant that is nourished by dead organic matter.

Sarmentose, producing long straggling woody branches.

Scabrous, very rough to the touch owing to short stiff hairs. **Scabrid**, **Scaberulous**, somewhat scabrous.

Scalariform, joined by transverse bars or with transverse markings like the rungs of a ladder.

Scandent, climbing.

Scape, a leafless and generally unbranched flower-stem arising from the ground.

Scarious, **scariose**, thin, dry, membranous, somewhat stiff and not green.

Schizocarp, a general name for a dry fruit which on maturity splits into one-seeded portions.

Sclerotic, hardened or stony in texture.

Scorpioid, said of a form of unilateral inflorescence which is coiled inward from the apex to the base in the bud like the tail of a scorpion.

Scurf, loosely adherent epidermal scales.

Secund, said of parts of organs all of which are turned in the same direction.

Sect, (suffix) deeply cut nearly to the axis.

Sepal, one of the parts of leaves of the calyx, especially when not combined; **Sepaloid**, green and resembling a sepal in structure.

Septicidal, a form of dehiscence of a ripe carpel when it opens through the dissepiments or lines of junction of the carpels.

Septifragal, a form of dehiscence of a ripe carpel when the valves break away from the dissepiments and leave the latter attached to the axis.

Spetum, pl. *septa*, see Dissepiment. **Septate**, divided by one or more partitions.

Seriate, in rows transverse or lengthwise.

Sericeous, covered with silky straight hairs.

Serrate, toothed like a saw with the teeth directed forward.

Serrulate, minutely serrate.

Sessile, without a stalk.

Seta, a bristle. **Setaceous**, bristle-like. **Setose**, bristly. **Setulose**, bearing minute bristles.

Sheath, a close fitting tubular or enrolled case, e.g., the lower portion of the leaf of grasses.

Simple, undivided; consisting of one blade when said of a leaf; resulting from a single pistil when said of a fruit; unbranched when said of a stem, tendril, or style.

Sinistorse, turning or twining from right to left i.e., clock-wise.

Sinus, the space between the divisions or lobes of a leaf. **Sinuate**, with an irregular deeply wavy margin.

Spadix, a spike with a thickened or fleshy axis bearing 1-sexual flowers generally sheathed in a spathe.

Sparse, arranged at some distance from each other.

Spathe, a large sheath-like bract enclosing an inflorescence or part of it. **Spathaceous**, spathe-like.

Spatulate, **Spathulate**, shaped like a spatula, i.e., oblong with a broad and rounded apex and gradually narrowed base.

Species, a group of individuals alike in all essential particulars; the subdivisions of a genus.

Spike, a racemose inflorescence bearing sessile flowers, on an undivided axis. **Spicate**, in the form of or resembling a spike, or disposed in spikes. **Spikelet**, a secondary spike; an ultimate branchlet of the inflorescence of grasses and **Cyperaceæ** generally consisting of one or more flowers subtended by glumes.

Spine, a strongly pointed woody process consisting of a modified branch but sometimes of a modified leaf. **Spinescent**, terminating in or resembling a spine-like sharp point; also becoming spinous. **Spinose**, **spinous**, furnished with or of the nature of spines.

Sporadic, occurring scattered here and there.

Spore, a minute unicellular body which detaches itself at maturity and is instrumental in the process of sexual reproduction, in Cryptogams.

Squamose, beset with scales.

Stamen, the male organ of a flower, consisting of a filament and an anther. **Staminode**, an abortive or antherless stamen.

Standard, the posterior or odd petal of Papilionaceous corolla.

Stellate, star-shaped; with radiating rays like points of a star.

Stigma, that part of the pistil which is specially adapted for the reception of the pollen for the fertilization of the ovules.

Stigmatic, relating to the stigma. **Stigmatose**, resembling or of the nature of the stigma.

Stipe, any stalk-like support; the stalk of an ovary above the floral whorls. Syn. gynophore. **Stipitate**, having a stipe.

Stipule, an appendage of a leaf, usually one on either side of the

- petiole. **Stipulate**, having stipules. **Stipel**, a secondary stipule, the appendage of a leaflet. **Stipellate**, having stipels.
- Stolon**, a prostrate or reclined branch rooting at intervals, or only at the tip and giving off shoots which become independent plants.
- Stone**, the hard endocarp of a drupe. Syn. Putamen.
- Striate**, marked with thin longitudinal lines or minute furrows.
- Strigose**, covered with sharp pointed straight stiff hairs of unequal length lying close along the surface and all in the same direction.
- Strophiole**, a crest-like appendage about the hilum or the base of a seed, C/p Caruncle.
- Style**, a stalk-like outgrowth from the summit of the ovary supporting the stigma.
- Stylopodium**, a fleshy disk at the base of some styles as in many Dipterocarpaceæ.
- Subulate**, shaped like a cobbler's awl; narrow, tapering and somewhat stiff.
- Succulent**, with abundant cellular tissue full of juice.
- Suffruticose**, said of plants when low woody and branching from near the base.
- Sulcate**, grooved or furrowed with the depressions more or less parallel.
- Superior**, inserted on the ovary or adnate to it, if said of the calyx: above the calyx and free from it, if said of the ovary; also posterior in position.
- Superposed**, placed one above the other.
- Suture**, a seam indicating the line of union of two parts; a line of opening.
- Symmetrical**, said of a flower having the same number of members in each whorl.
- Syncarpous**, composed of two or more combined carpels.
- Syncarpium**, a fruit formed by the union of several carpels which have become compacted and fleshy.
- Syngenesious**, said of stamens united by their anthers, as in Compositæ.

T

- Tap-root**, primary root resulting from the direct prolongation of the radicle.
- Tendril**, a slender process usually belonging to the axis and serving as a support in climbing.
- Tepal**, a division of a perianth; a word applicable to either a sepal or a petal. "An anagram of petal," Jackson.
- Terete**, cylindrical, rounded in cross section.
- Ternate**, arranged in threes in a cluster of whorl.
- Tesselated**, divided up into small squares.
- Testa**, the outermost coat of a seed.
- Tetra**, (prefix) four.
- Tetradynamous**, with four long and two short stamens.

Tetramerous, said of a flower having the parts or members in each whorl in fours.

Tetrandrus, with four stamens.

Thalamus, that part of the axis of a flower which supports the floral whorls and the pistil. Syn. Torus.

Thyrus, a contracted panicle, ovate or lanceolate in outline, usually with cymose branches. **Thyriform**, of the shape of a thyrus.

Thyrroid, somewhat like a thyrus.

Tigellum, **Tigellus** (plu.), the central embryonic axis consisting of radicle and plumule.

Tiller, a sucker from the base of a stem.

Tissue, an aggregation of cells differentiated from surrounding aggregations.

Tomentose, covered with short, soft, rather dense and more or less tangled hairs.

Tortuous, bent irregularly in different directions.

Torulose, cylindrical with contractions at regular intervals.

Torus, same as thalamus.

Tri, (prefix) three.

Tribe, a division of a family, comprising a number of closely-related genera.

Trichotomous, with the divisions always in threes and of more or less the same length.

Tricuspidate, with three cusps or sharp points.

Trimerous, said of a flower having the parts or members in each whorl in threes.

Triplinerved, with a strong secondary nerve on either side of the midrib proceeding from near the base.

Triquetrous, sharply 3-cornered.

Tristichous, in three vertical rows.

Truncate, ending abruptly, as if with the end cut off.

Tuber, a thickened underground stem bearing buds or 'eyes.'

Tuberous, swollen like a tuber.

Tumid, swollen.

Turbinate, top-shaped; like an inverted cone.

Turgid, swollen and more or less firm.

U

Umbel, a form of racemose inflorescence in which several branches or pedicels radiate from the top of a common peduncle and are of nearly the same length.

Umbonate, bearing a boss, or conical or rounded protuberance.

Undulate, with a wavy margin.

Uni, (prefix) one.

Unicellular, formed of, or consisting of, only one cell.

Unilateral, arranged on one side of the axis.

Unisexual, of one sex; having the stamens and the pistil in separate flowers.

Urceolate, urn-shaped.

Urticle, a 1-celled 1-seeded fruit with a thin and more or less loose pericarp.

V

Valvate, with the margins of the members of a whorl only meeting without overlapping. Also dehiscing by valves.

Varicose, irregularly swollen at intervals.

Variety, a group of individuals differing from others of the same species in certain striking particulars which, however, are not of a nature to justify specific rank; sub-divisions of a species.

Venation, the mode in which the veins are disposed in a leaf.

Ventral, relating to, attached to the, or opening by the inner angle, or anterior face of a carpel.

Venulose, closely and finely veined.

Ventricle, a lateral swelling or bulging out. **Ventricose**, having a ventricle; unequal swollen.

Verrucose, covered with wart-like excrescences.

Versatile, swinging to and fro; said of an anther attached by the back to the attenuated top of the filament on which it swings.

Verticillate, arranged in whorls.

Villous, **Villose**, more or less thickly covered with long soft simple hairs.

Virgate, with slender erect rod-like stems or branches.

Vitta, pl. **Vittæ**, one of the oil receptacles in an umbellifer fruit.

Viviparous, said of plants, the seeds of which germinate before falling; also sometimes of such seeds.

W

Whorl, a collective name for all similar members that are arranged in a circle, round an axis.

Wing, any thin membranous appendage. **Wings**, the side petals of a papilionaceous corolla.

X

Xerophyte, said of plants that grow naturally in dry hot places.

Xylem, woody tissue.

Z

Zygomorphic, capable of being bisected into similar halves by the median plane only; said usually of irregular flowers.

LIST OF ABBREVIATIONS AND SIGNS USED IN THE FLORA.

Ass.	..	..	..	Assamese.
Beng.	..	..	..	Bengali.
Cach.	..	..	..	Cachari.
Darr.	..	..	..	Darrang.
Duff.	..	..	..	Duffla.
fem.	..	..	..	female.
flrd.	..	..	..	flowered.
fls. or flrs.	..	..	..	flowers.
1-2, 6-8	..	..	..	January to February. June to August.
fr.	..	..	..	fruit.
ft.	..	..	..	foot or feet.
herm.	..	..	..	hermaphrodite.
Hind.	..	..	..	Hindi.
in.	..	..	..	inch or inches.
Kach.	..	..	..	Kachari.
Kam.	..	..	..	Kamrup.
Kh.	..	..	..	Khasi.
loc.	..	..	..	locular.
Lush.	..	..	..	Lushai.
Manip.	..	..	..	Manipur.
Mik.	..	..	..	Mikir.
m. s.	..	..	..	moderate or middle-sized.
Nep.	..	..	..	Nepali.
Sans.	..	..	..	Sanskrit.
Sibs.	..	..	..	Sibsagar.
sp.	..	..	..	species.
stip.	..	..	..	stipule.
Sylh.	..	..	..	Sylhet.
syn.	..	..	..	synonym.
Synt.	..	..	..	Synteng.
Tipp.	..	..	..	Tippera.
var.	..	..	..	variety.
♂	..	..	..	male.
♀	..	..	..	female.
∞	..	..	..	indefinite, numerous.
!	.....	Added after a locality, but without the name of collector or herbarium signifies that the author has himself seen the plant in the locality named.		
!	.....	The same sign following the name of a person in italics signifies that the author has either not seen it or is uncertain of the identification.		
=	.....	Equal to or Synonym.		
?, (?)	.....	Doubtful.		
+	.....	The plus sign when used for parts of a flower. e.g., petals 3+3, indicates separate whorls. In the example two whorls of 3 petals in each whorl.		

FLORA OF ASSAM

THALAMIFLORÆ.

FAM. 1. RANUNCULACEÆ.

Herbs or climbing shrubs. *Leaves* alternate, rarely opposite, usually ex-stipulate, simple or compound; petiole sheathing. *Flowers* usually regular, generally ebracteate. *Sepals* 4-5 or more, usually caducous, often coloured. *Petals* hypogynous, generally imbricate, 3-5 or more, often reduced or deformed, sometimes absent. *Stamens* hypogynous, usually numerous, often in many rows; anthers adnate and usually dehiscing laterally. *Ovary* apocarpous, rarely syncarpous; carpels many or few, free, 1-celled with one or more anatropous, erect or pendulous ovules. *Fruit* either of many achenes or of follicles, rarely a berry seeds small with copious albumen and minute embryo.

I. Flowers regular. Carpels 1-ovuled:—

Erect or climbing shrubs:—

Leaves opposite. *Sepals* petaloid, valvate.

Ovules pendulous:

Leaves various, not terminating in a tendril. *Petals* 0. 1 **Clematis.**

Leaves consisting of two opposite leaflets and a terminal tendril. *Petals* many, linear. . . . 2. **Naravolia.**

Herbs:—

Petals 0. *Sepals* 4-5, petaloid. *Ovule* pendulous:—

Flowers in umbelliform cymes, involucrate. . . . 3. **Anemone.**

Flowers paniced, not involucrate. . . . 4. **Thalictrum.**

Petals and *sepals* both present. *Flowers* paniced.

Ovule erect. . . . 5. **Ranunculus.**

II. Flowers irregular, racemed. Carpels many-ovuled. . . . 6. **Delphinium.**

1. CLEMATIS, Linn.

Shrubs, mostly woody, climbing by means of their petioles. *Leaves* opposite, exstipulate, usually compound; leaflets often lobed and irregularly toothed. *Flowers* in axillary fascicles or panicles, rarely solitary or terminal. *Sepals* usually 4, valvate, petaloid. *Petals* 0. *Stamens* and *carpels* indefinite. *Fruit* a head of achenes usually with elongated feathery styles.

1. Flowers not paniced:—

Flowers axillary, solitary, bluish; pedicels long bracteate. Achenes without feathery tails. *Leaves* ternately compound. . . .

1. **C. Cadmia.**

Flowers axillary, 1-3 in each axil, brownish; pedicels short, ebracteate. Achenes with feathery tails. *Leaves* 2-pinnate. . . .

2. **C. acutangula.**

Flowers axillary fascicled white; pedicels long, ebracteate. Achenes with feathery tails. *Leaves* 3-foliolate. . . .

3. **C. montana.**

II. Flowers in axillary panicles. Achenes with feathery tails :—

- A. Sepals spreading from the base :—
 Leaves usually simple. Flowers large ; sepals brown outside, purple or white inside. ... 4. *C. smilacifolia*.
 Leaves 3-foliolate, long petioled. Flowers very small. ... 5. *C. apiculata*.
 Leaves once pinnate. Flowers small ; sepals 3-nerved. ... 6. *C. puberula*.
 Leaves 2-pinnate or 2-ternate. Flowers small ; sepals greenish-white. ... 7. *C. gouriana*.
 B. Sepals erect with recurved tips :—
 Leaves 3-foliolate, rarely simple, shining. Flowers fairly large. ... 8. *C. acuminata*.
 Leaves pinnately 3-5-foliolate. Flowers large ; sepals brown-tomentose outside, pubescent inside ; not ribbed ; anthers very long, twisted after flowering. ... 9. *C. grewiczfoiia*.
 Leaves pinnately 5-7-foliolate. Flowers large, brownish ; sepals linear-oblong, ribbed, tomentose throughout ; anthers not twisted after flowering. ... 10. *C. Buchananiana*.
 Leaves decomposundly pinnate. Flowers large, pale yellow ; sepals many nerved. ... 11. *C. nutans*.

1. *Clematis Cadmia*, Ham. Vern. *Bon-jalukia*, Ass. (Lakh.)
Bon-marich, Ass. (Goal).

A slender sub-herbaceous climber. *Leaves* 3-9 in. long, ternately decomposed ; ultimate leaflets, 7-2 by 25-1 in. narrow-lanceolate to ovate or rhomboid, entire or minutely crenulate, acuminate, more or less ciliate along the margins otherwise glabrous, 3-5-nerved from the acute, cuneate or rounded, rarely sub-cordate base ; other nerves 1-3 on either half, much arched, anastomosing, very indistinct. *Flowers* axillary, solitary ; peduncles 3-4 in. long, with a pair of opposite, leaflike, sessile or short-petioled bracts about the middle. *Sepals* 5-6, bluish-white, 8-1 by 2-5 in. longitudinally veined, softly tomentose behind. *Filaments* numerous, short flat, glabrous ; anthers 1-15 in. long, dehiscing laterally. *Achenes* many, ovate, with a long straight beak and no feathery tail.

BRAHMAPUTRA VALLEY generally with reeds along edges of open swamps, also in SYLHET. *G. Mann* !
 Fls. 1-4. Fr. 2-6.

2. *Clematis acutangula*, Hk. f. & Th.

A slender woody climber ; stem deeply furrowed, sparingly puberulous, shining. *Leaves* 2-pinnate 5-9 in. long ; common petiole 2-5 in. long ; pinnæ generally 3-foliolate ; petiolules of pinnæ 1-5-3 in. long. *Leaflets* 5-2 by 15-8 in. ; ovate or ovate-lanceolate, acute, or acuminate, deeply serrate or lobed, coarsely hairy on both surfaces. *Flowers* brownish-yellow, about 7 in. diam. ; pedicels 1-3 from each axil, 1-15 in. long, not bracteate. *Sepals* 4 or 5, about 4 in. long, oblong, acute, puberulous outside. *Filaments* pilose ; anthers introrse. *Achenes* ovate, strongly margined, pubescent ; feathery style about 1 in. long, brownish.

KHASI HILLS, 4-5,000 ft., not very common.

Fls. 9-12. Fr. 10-1

3. Clematis montana, Ham. Vern. **Jarmai-thobawa*, Synt. A large, but not very heavy, woody climber; young parts pubescent. *Leaves* 3-foliate, fascicled at the nodes; common petiole 1·5-2·5 in. long. *Leaflets* 1-4 by ·5 to 2 in., ovate, distantly cuspidate-serrate, acute, membranous, scattered hairy or glabrescent, 3-5-nerved from the base; tertiary nerves few, distant, indistinct; lateral petiolules 1-3 in. long. *Flowers* white, axillary, solitary, 2-3 in. diam., faintly scented; peduncles 2·5-4 in. long, terete, pubescent. *Sepals* 4, 1-1·5 by ·5-8 in., acute or acuminate, longitudinally veined, softly tomentose along the margins. *Filaments* short; anthers shorter than the filaments, introrse. *Achenes* glabrous or hairy; style 6-12 in. long, rather stout; densely hairy.

KHASI HILLS. 4-5,000 ft., e. g., Shillong, Nong-kasem, Sutunga, etc. NAGA HILLS. C. B. Clarke!

Figs. 4-5. Fr. 5-6.

4. Clematis smilacifolia, Wall. Vern. *Mei-long-kydup*, Khasi.

A large woody climber; branches sulcate glabrous, green or purplish. *Leaves* usually simple; blade 3-9 by 1-6 in. ovate-cordate, acuminate, gradually smaller and narrower and with a cuneate base towards the ends of the branches, entire or distantly serrate, coriaceous, glabrous, 5-9-nerved from the base, tertiary nerves faint, more or less transverse; petioles 3-6 in. long, terete, often much coiled and functioning as tendrils. *Panicles* axillary, 6-12 in. long; pedicels 1·5-2 in. long, with linear bracteoles at the base. *Flowers* 1-1·5 in. across, sweet-scented. *Sepals* 4-5, ·7-1 in. long, oblong, greenish-brown tomentose outside, glabrous and purplish or whitish inside. *Filaments* linear, membranous, glabrous gradually shorter towards the centre of the flower; connectives produced. *Achenes* ·3-4 by ·1 in., flat, acute at both ends, with thickened margins which coalesce and prolong to form a slender feathery tail 1·5-2·5 in. long and of a cream colour.

LOWER ASSAM, e.g., Bijni Reserve, GOALPARA, also KHASI HILLS up to 4,000 ft., e.g., Nonghulen.

FIS. 9-10. Fr. 11-1.

5. Clematis apiculata, Hk. f. & Th.

A slender woody climber; branches, sulcate, patently grey, hairy. *Leaves* 3-foliate, sometimes simple and 3-lobed; common petiole 2-3 in. long, slender, patently hairy. *Leaflets* ·8-3 by ·6-2 in., ovate-cordate, acuminate, crenate-serrate, membranous, sparsely pubescent on both surfaces, ciliate; lateral petiolules 2-7 in. long. *Flowers* small in many-flowered axillary panicles. *Sepals* 15-25 in. long, oblong, tomentose outside. *Filaments* short, linear. *Achenes* oval, hairy.

KHASI HILLS near Beadon Falls! also Nongkhlaw. Griffith! and Cherra, Hk. f. & Th. Apparently not very common.

Fig. & Frg. time not known.

6. Clematis puberula, Hk. f. & Th.

A slender climber; stem deeply grooved, downy. *Leaves* pinnate. *Leaflets* 1-1·5 in. long, ovate-lanceolate, remotely toothed

sparsely hairy. *Flowers* rather small in few-flowered axillary panicles; pedicels slender. *Sepals* about 5 in. long, linear-oblong, 3-nerved, silky outside. *Filaments* narrow; anthers short. *Achenes* silky.

KHASI HILLS. 2-4,000 ft. Rather rare.

Fig. & Frg. time not known.

7. *Clematis gouriana*, Roxb. Vern. *Jyrm-bytengdoh*, Khasi.

A large spreading climber; branches purple, sulcate, pubescent when young. *Leaves* 2-pinnate or 2-ternate. *Leaflets* 1.3-5 by 3.1-3 in., ovate, oblong or lanceolate, acuminate, entire or distantly toothed, rounded or cordate at the base, chartaceous or membranous, wholly glabrous or sometimes pubescent beneath. *Flowers* greenish-white, small, in dense axillary panicles; ramifications of panicle bracteate at the base. *Sepals* 2-3 in. long, oblong, revolute; margins tomentose; *filaments* narrow. *Achenes* about .05 in. long, narrow-oblong or lanceolate, densely grey-hairy; feathery tails 1.5-2 in. long, very slender.

¹⁰ Common in LOWER ASSAM, especially GOALPARA, also up to 4,000 ft in the KHASI HILLS.

Fls. 10-11. Fr. 11-1.

8. *Clematis acuminata*, DC. Vern. *Tulli-tymen-khla* Synt.

A large woody climber; branches slender, terete, smooth, glabrous. *Leaves* 3-foliolate, very rarely simple; common petiole 1-1.5 in. long, slender, terete. *Leaflets* 1.5-3.5 by .5-1.3 in. ovate, or oblong-lanceolate, caudate-acuminate, usually quite entire, membranous or subcoriaceous, glabrous; lateral nerves slender, irregular, very indistinct. *Flowers* 1-1.5 in. across, in decompound axillary panicles. *Sepals* oblong-lanceolate, more or less pubescent outside, suberect. *Filaments* clothed with long spreading hairs. *Achenes* silky.

Evergreen forests in UPPER ASSAM, e.g., near Tippu in LAKHIMPUR and possibly in many other similar localities.

Fig. and Frg. time not known.

Var. sikkimensis, distinguished by larger leaflets and more numerous flowers, occurs at Nongpoh in the KHASI HILLS, also in the MISHMI HILLS.

9. *Clematis grewifolia*, DC. Vern. *Mei-iung* (black climber), *Mei-su-ing*, Khasi.

A large woody climber; branches closely sulcate and more or less densely dun-pubescent. *Leaves* 3-5 foliolate; common petiole 3-4 in. long, stout, often curled, as well as the rest of the rachis, densely brown-tomentose. *Leaflets* 2-3.5 by 1.5-2.5 in. broadly ovate-cordate, dentate, serrate, often lobed, membranous or softly subcoriaceous, coarsely scattered-hairy or sub-glabrous above, more densely hairy especially along the nerves beneath, 5-nerved from the base; lateral petiolules .5-1 in. long, with a tendency to curl. *Panicles* 4-8 in. long, on peduncles 1.5-4 in. long; buds globose or ovoid; pedicels 1-2 in. long, often twisting, supported by bracts resembling variously lobed miniature leaflets. *Sepals* .8-1.2

in., ovate or oblong, greenish-brown and densely tomentose outside, pubescent or puberulous inside. *Filaments* .7-1 in. long, tapering from a narrow linear base, densely covered with ascending hairs; *anthers* .25-.3 in. long, very narrow, twisted after flowering. *Achenes* scarcely .1 in. long, flat, ovate, velvety; feathery tail about 1 in. long, densely white-silky.

North Cachar and Khasi Hills, 3,500 ft. *e. g.*, Maibong, Kynshi, Mairong, Mawsynrang, etc.

Fls. 11-12. Fr. 12-1.

10. Clematis Buchananiana, DC. Vern. *Mei-byteng-doh*, *Mei-lih* (white climber), Khasi; *Jermai-sniuh*, *Tilli-kynsaw-blai*, Synt.

A woody climber; branches sulcate, pubescent while young. *Leaves* pinnately 5-7-foliate; common petiole 2-3.5 in. long, often twisted. *Leaflets* 2-4 by 1.5-2.7 in. broadly ovate or suborbicular, generally cordate, coarsely dentate-serrate, often irregularly lobed, subcoriaceous or membranous, glabrescent above, pubescent beneath chiefly along the nerves, 3-5-nerved from the base; lateral petiolules .6-1.2 in. long, often curled. *Flowers* about 2 in. across, usually sweet-scented, in large axillary panicles. *Sepals* linear-oblong fleshy, longitudinally many-ribbed, softly silky-tomentose. *Filaments* hairy. *Achenes* ovate-lanceolate, densely hairy; hairy tail elongating in fruit to about 2 in.

North Cachar Hills at about 4,000 ft. Khasi and Jaintia Hills, 4,000-5,500 ft. Very common in the Mantadu valley in the Jawai Sub-Division.

Var. *vitifolia* distinguished by pubescent stems and membranous pubescent leaves, is fairly common in the above tracts.

Fls. & Fr. 12-1.

11. Clematis nutans, Royle.

Stem slender, woody, angled, sulcate, with leaves very pungent to the taste. *Leaves* twice or thrice, pinnate. *Leaflets* 1-3 in. long, ovate or lanceolate, usually deeply 3-5-lobed, rarely entire, silky-pubescent; veins slender. *Flowers* 1-2 in. across, cream-coloured in much-branched panicles. *Sepals* .5-.7 in. long, oblong, closely nerved, silky outside, erect at the base, recurved at the tip. *Filaments* tapering, silky along the lower half; *anthers* short, *Achenes* large, ovate, covered with silky hairs; hairy tail 1-1.5 in. long in fruit, very slender.

Occurs chiefly in the Jawai Sub-Division, Khasi and Jaintia Hills, in the neighbourhood of Nartiang.

The leaves when smelt after bruising produce violent sneezing.

Fls. 11-12.

Clematis tortuosa, Wall. Cat. 4675. ex. C. E. C. Fischer, Kew Bulletin 1929 p. 4. Incl. C. *Buchananiana*. DC. var. *tortuosa*, Wall. Cat. 4675 and var. *vitifolia*, Wall. Cat. 4676.

Branches pilose with long spreading fulvous hairs. *Leaf rachis* and *petiole*, pilose or pubescent with brown hairs. *Leaflets* 2-5 by .7-4.5 in. ovate-lanceolate to suborbicular, acuminate base 5-7-nerved, margins irregularly coarse dentate, or crenate-dentate, teeth apiculate, membranous or subcoriaceous, thinly pilose on both surfaces or only on the nerves; petiolules .5-4 in. long, often twining. *Panicles* axillary, densely to thinly fulvous pilose; pedicels .7-1.5 in. long. *Sepals* 4, erect, oblong, apex recurved, .5-.8 in. long, densely clothed with light brown hairs outside. *Carpels* pilose, styles long, slender densely silky.

Very closely allied to *C. Buchananiana* of which it has been regarded as a variety in F. B. I.

SYLHET Wall. Cat. 4675 ! KHASI HILLS Wall Cat. 4676 ! Hooker and Thomson, NAGA HILLS—Kingdon Ward, LUSHAI HILLS Mrs. Parry.

2. NARAVELIA, DC.

Naravelia zeylanica, DC. Vern. *Gorap-choi*, Ass. ; *Ohhagal-lati*, Beng. ; *Ramnam-riube*, Miri ; *Khoro-soi-rikang*, *Nongnongbiki-ringkang*, Mik. ; *Jyrmal-lasam*, Khasi ; *Sangongri*, *Shamgangri*, *Behalisham*, Garo.

A woody climber generally spreading on bushes in scrub jungles ; branches sulcate, adpressed pubescent. *Leaves* pinnately 5-foliolate on seedlings, but on mature plants the upper three leaflets become reduced to tendrils ; common petiole 1·5-3 in. long. *Leaflets* usually only two, often in unequal pairs, 2-6 by 1·7-4·5 in., ovate-rotundate, acuminate, rounded or cordate and often abruptly cuneate at the base, entire or distantly toothed subcoriaceous, glabrous and somewhat shining above, more or less pubescent along the nerves and nervules beneath, 5-7 nerved from the base, nervules reticulate, very close ; petiolules 3-1·5 in. long, usually more or less twisted, densely pubescent. *Panicles* terminal and axillary, 4-18 in. long. *Flowers* greenish, 5-7 in. across ; pedicels 5-8 in. long, slender, pubescent. *Sepals* 4-5, 2-3·5 in. long, densely buff-tomentose outside, caducous. *Petals* usually 12, about 5 in. long, greenish, club-shaped. *Stamens* numerous. *Fruit* a head of tailed achenes. *Achenes* 2-2·5 in. long, pointed at both ends, shortly stipitate, more or less twisted, brown when mature ; tail 2-3 in. long, very slender, finely hairy.

Throughout the BRAHMAPUTRA VALLEY and both slopes of the GARO and KHASI HILLS up to 2,500 ft.

The stems are used as tooth-sticks to cure toothaches and can be twisted into rough but strong ropes,

Fls. 10-11. Fr. 12-3.

3. ANEMONE, Linn.

Perennial herbs. *Leaves* radical, more or less lobed or divided. *Flowers* single or several together on simple or branched scapes, supported by a 3-partite involucre ; bracts free or connate. *Sepals* 4-20, petaloid, white or bluish, imbricate. *Petals* 0. *Stamens* numerous, outer sometimes petaloid. *Carpels* many, 1-ovuled ; ovules pendulous. *Fruit* a head of sessile achenes, beaked with short or long, hooked or straight, naked or bearded, persistent styles.

Stems branched. Ultimate segments of involucre linear-oblong. Achenes large, oblong. Beak hooked, naked.

1. *A. rivularis*.

Stems elongate usually not branched. Ultimate segments of involucre oblong, or cuneate. Achenes compressed, broadly oval. Beak straight, naked.

2. *A. elongata*

1. *Anemone rivularis*, Ham. Vern. *Batsoh-plia*, Khasi.

Stem branched, 1-3 ft. high; rootstock woody, sheathed in fibres. *Leaves* radical, 2-6 in. diam., silky pubescent beneath, palmately 3-partite, inducing sneezing if smelt after bruising; segments primarily 2-or 3-lobed and serrate; nerves straight, prominent beneath sparingly anastomosing; petiole 4-6 in. long.

Flowers about 1 in. across in compound cymes, 2-bracteolate; sepals white within, generally bluish and silky outside. *Involucre leaves* large, 3-partite; ultimate segments linear or linear oblong, inciso-serrate. *Achenes* oblong glabrous; style hooked.

Common in shady or dampish place in the KHASI HILLS between 4,000 and 4,500 ft.

Fls. 4-7.

2. *Anemone elongata*, Don.

Stem slender, unbranched or sparingly branched 2-3 ft. high, pubescent. *Radical Leaves* 2-4 in. diam., orbicular in outline cordate, 3-partite, sparingly hairy; segments 2-3-lobed; lobes, dentate. *Flowers* white, smaller than of the above, in fascicles of 2-3 in few-flowered elongate compound cymes. *Involucre leaves* oblong or cuneate, irregularly toothed.

Fairly common in the KHASI HILLS. 5,000 ft.

4. THALICTRUM, Linn.

Erect perennial herbs; stem hollow. *Leaves* ternately or pinnately once to thrice or more times compound, rarely simple; petioles sheathing, often auricled or stipuled. *Flowers* generally paniced, rarely racemed, never involucre, often polygamous. *Sepals* 4-5, petaloid, imbricate in bud. *Petals* 0. *Stamens* numerous. *Carpels* few or many; ovule 1, pendulous. *Fruit* a head of small achenes; style persistent or deciduous.

Filaments filiform. Achenes small:—

Leaves 1-2-ternate: leaflets 5-2 in. diam.

... 1. *T. punduanum*.

Leaves pinnately decomposed; leaflets

usually not exceeding 5 in. in diam.

... 2. *T. foliolosum*.

Filaments club shaped. Achenes large—

Leaves ternately decomposed: leaflets not

exceeding 5 in. in diam.

... 3. *T. javanicum*.

1. *Thalictrum punduanum*, Wall.

Stem erect about 2 ft. high. *Leaves* ternate or 2-ternate; leaflets 1-2 in. in diam., more or less orbicular, cordate or truncate at the base, 5-lobed, crenate, glaucous, or tomentose beneath; sheath auricled. *Panicle* much branched. *Flowers* white; filaments filiform. *Achenes* numerous, small, ribbed, sessile or stalked.

Two varieties occur almost side by side, in the KHASI HILLS.

Var. 1. *glaucum*. Leaflets membranous, glabrous, glaucous beneath. Achenes sessile, glabrous.

Var. 2. *glandulosum*. Leaflets coriaceous, viscid-pubescent beneath. Achenes stalked or subsessile, glandular hairy.

2. *Thalictrum foliolosum*, Bl. Vern. *Popum*, Khasi.

By far the tallest plant in the genus reaching up to 8 ft. in height; stem glabrous. *Leaves* pinnately decomposed up to the

fourth degree; leaflets 15-25 lin., but sometimes up to 8 in. in diam., sub-orbicular, membranous, glabrous, glaucous beneath sheath auricled. *Panicle* axillary and terminal, profusely divided bracts and bracteoles minute. *Flowers* 1-15 in. long, polygamous, on filiform pedicles, dull bluish or greenish-white; filaments filiform. *Achenes* few, 12 in. long, sharply 8-ribbed.

KHASI HILLS, 3-6,000 ft., e. g., Borpani, Happy Valley, Nongbri, etc.

The root is good for fever and eye diseases and is used in the form decoction, extract or powder. In the last named form it is known as *Surma mamira* in Kashmir.

Fls. Rainy season.

3. *Thalictrum javanicum*, Bl.

Stem erect, 2-3 ft. high, glabrous. *Leaves* several times ternately decomposed; leaflets 2-8 in. diam., ovate or orbicular, membranous, glabrous, somewhat glaucous beneath, 3-7-toothed; base, rounded or cordate. *Panicle* laxly branched; stipules adnate, imbricate. *Flowers* about 2 in. long, white, on filiform pedicels 4-6 in. long; filaments club-shaped. *Achenes* up to 15, about 25 in. long, strongly ribbed; beak short.

KHASI HILLS, 5-6,000 ft.

May be used as a substitute for *T. foliolosum*.

Fls. 7-9.

5. RANUNCULUS, Linn.

Annual or perennial herbs generally gregarious in habit. *Leaves* simple, lobed or dissected; petiole sheathing; stipules membranous or 0. *Flowers* paniced, or single. *Sepals* 3-5, imbricate in bud, caducous. *Petals* usually 5, often with a nectary near the base. *Stamens* many, *Carpels* numerous; styles very short; ovule 1, ascending. *Fruit* generally a head of beaked or apiculate achenes.

An aquatic herb. Flowers small not paniced.

Receptacle of achenes hairy.

... 1. *R. scleratus*.

Terrestrial herbs:—

A much-branched diffuse herb. Flowers solitary, Receptacle small, elongated, not hairy.

... 2. *R. diffusus*.

A sparingly branched tall herb. Flowers laxly paniced. Receptacle small, pilose.

... 3. *R. pensylvanicus*.

1. *Ranunculus scleratus*, Linn.

An annual herb, 1-2 ft. high, generally growing along the edge of water, stem fleshy, hollow, usually glabrous, *Radical leaves* 3-partite, segments cuneate; cauline sessile. *Flowers* 5-6 in. diam. *Sepals* as long as the petals reflexed. *Receptacle* 5 in. long, hairy. *Achenes* about 1 in. long, with a continuous intermarginal ridge all round.

Goalpara, W. R. Fisher

This plant has an acrid juice and is used for medicinal purposes.

2. Ranunculus diffusus, DC.

A perennial diffuse or prostrate herb with spreading hairs and fibrous roots, often shooting from the nodes. *Leaves* 3-partite, softly hairy; segments cuneate. *Flowers* 5-1 in. diam., solitary on terminal or leaf-opposed peduncles 1-2 in. long. *Sepals* hirsute, smaller than the petals. *Petals* white or yellow. *Receptacle* small. *Achenes* compressed, cuneately sub-orbicular, margined.

KHASI HILLS, G. Mann 1 5, -6,000 ft.

3. Ranunculus pensylvanicus, Linn.

An erect or prostrate plant 2-3 ft. long. *Radical leaves* 3-foliate, long-petioled, leaflets 3-partite deeply cut into linear segments; cauline with petioles of decreasing lengths, the uppermost being sessile. *Flowers* about 1 in. long. *Sepals* reflexed, hirsute. *Receptacle* pilose. *Achenes* compressed, with an intramargined ridge.

A weed of rice-fields in the KHASI HILLS and the plains of ASSAM.

6. DELPHINIUM, Linn.

Delphinium altissimum, Wall. Vern. *Rad-sohplih-rit*, Khasi.

Stem 2-4 ft. much branched. *Leaves* few, palmately lobed, 5-7 fid; segments broadly cuneate, 3-lobed, coarsely toothed, few-nerved, sparsely hairy above, ciliate along the nerves beneath, cauline 3-lobed, or entire; petiole up to 1 ft. in length. *Flowers* 1-1.5 in. long including the spur, in lax racemes, irregular, purple or lurid-blue, very foetid; pedicels 5-2 in. long; bracts and bracteoles linear. *Sepals* 5, golden-hairy, strongly ciliate, dorsally spurred behind; spur 6-8 in. long, subulate, incurved. *Petals* 4, the two dorsal with long slender spurs within the spur of the dorsal sepal; anterior petals 2-lobed, hairy. *Stamens* many; filaments about 3 in. long, glabrous. *Fruit* of 3 pubescent follicles.

KHASI HILLS, 5,500-6,000 ft., e. g., Mawphlang, Sohiong, etc.

Coptis Teeta, Wall.

A stemless herbaceous plant of this Family which grows in the temperate regions of the Mishmi Hills and yields the drug *Mishmi-tita* much used in Bengal and elsewhere. The roots are gathered towards the end of the rainy season and are carried in tiny little wicker baskets to Sadiya where dealers from other provinces go to buy them.

Many other medicinal plants, such as *Aconitum*, *Pulsatilla*, *Cimicifuga*, etc., belong to this Family, but they do not occur in Assam.

FAM. 2. DILLENIACEÆ.

Trees or climbing shrubs. *Leaves* simple, alternate, ex-stipulate, close and parallel-veined, generally rough and hard. *Sepals* 5, broadly overlapping, persistent. *Petals* usually 5, rarely 2-4, deciduous. *Stamens* numerous. *Carpels* 1 or 5-20, in the latter case generally cohering in the axis; ovules 100 or few or many, attached to the ventral suture. *Fruit* follicular or baccate. *Seeds* arillate, albuminous; embryo minute.

Climber. Fr. dry, of 1 carpel and 1 seed. 1. *Delima*.
Trees. Fr. fleshy, of 5-20 many-seeded carpels. 2. *Dillenia*.

1. DELIMA, Linn.

Delima sarmentosa, Linn. Vern. *Ou-lota*, *Oua-lota*, *Panlewa* Ass.; *Bau-taruk*, Daff.; *Samphot-rikang*, Mik. *Aithlang shrui*, Kuki; *Hruisen*, Tipp.; *Thegdi-douka*, Cach.

A harsh evergreen climber. Stem cinnamon coloured, exfoliating in square or rectangular pieces. L. 3-6 by 2-2.5 in. elliptic or oblong, more or less cuneate at base, scabrid on both surfaces, unchanged in colour when shed; pet. 6-8 in. long, pilose, channelled; lateral nerves 14-16 pairs, almost straight and parallel, depressed above, raised beneath. *Flowers* white, in terminal panicles. *Sepals* reflexed. *Petals* obovate, ciliate. *Ovary* of one carpel only. *Follicle* 1-seeded. *Seed* arillate.

Common in evergreen forests throughout the province.

The stem quickly cut into pieces gives copious and wholesome potable water. The leaves can be used as a substitute for sand-paper in polishing wood, horn or ivory.

Fls. 5-7. Fr. 7-9.

2. DILLENNIA, Linn.

Trees with large leaves crowded at the ends of branches. *Flowers* large, white or yellow, more or less scented. *Sepals* 5, persistent, much thickened in fruit. *Petals* 5. *Anthers* opening by terminal slits or pores. *Fruit* of 5-20 carpels cohering in the axis, enclosed in the thickened sepals. *Seed* generally immersed in pulp.

I. Each pedicel bracteate about the middle. Leaves flat:—

Fls. white, solitary, 6-8 in. diam. Fr. 3-5 in. diam. ... 1. *D. Indica*.

Fls. yellow, fascicled, not exceeding 2-3 in. in diam.

Fr. less than 1 in. in diam. ... 2. *D. scabrella*.

II. Individual pedicels ebracteate (fascicles of them bracteate only at the base). Leaves V-shaped in transverse section.

... 3. *D. pentagyna*.

1. *Dillenia indica*, Linn. Vern. *Ou-tenga*, *Panchkol*, Ass., *Chalta*, *Chalita*, Beng.; *Sompa*, *Sampa*, Miri; *Chumpa*, Abor; *Pumplang*, Mik.; *Thegdi bapahng*, *Thardi*, Cach.; *Bau-changne*, Daff., *Aithlong*, Lushai; *Aitrang* Kuki; *Aitang*, *Jongphang*,

Tipp.; *Hægri*, Manip.; *Thagi*, Mech. Dieng-soh-karbam, Kh. Dong-phang-thai, Naga.

An evergreen* tree up to 60 ft. in height and 6 ft. in girth, often fluted or buttressed at the base, with a large oval crown. Bark cinnamon coloured or reddish-grey, peeling off in more or less papery and fragile flakes reddish inside with fine and close veins of deeper red. Leaves 6-12 by 3-5 in., petioled, oblanceolate or narrow-elliptic, more or less V-shaped in transverse section, glabrous above, pubescent beneath, sharply serrate; lateral nerves 30-40, very prominent beneath making a narrow angle with the midrib. Flowers 6-8 in. across. Petals white, very tender. Fruit 3-5 in. in diam., always green, with 16-20 carpels tightly enclosed inside the much-thickened sepals. Seeds compressed.

Very common and often gregarious in damp places and round swamps in all Districts.

Wood reddish-brown, elastic. The timber is considered very good for ridge, poles and is durable under water. The fruit (fleshy calyx) is eaten raw or cooked and also used medicinally.

Fls. 6-8. Fr. 2-4.

2. *Dillenia scabrella*, Roxb. Vern. *Banji-ou*, Ass. *Mandiphang* or *Munde-phang*, Kach.; *Chirimso*, Mik. *Mangie-thing*, Kuki; *Agatchi-bádura*, Garo.

A deciduous tree up to 50 ft. in height and 5 ft. in girth with a fluted trunk and more or less horizontal branches. Bark brown and rather rough outside, light-pink inside with rather coarse brownish radial veins, turning darker brown after exposure. Leaves 8-15 by 4-7 in., flat, oblanceolate to elliptic, cuspidate-serrate, rather membranous for the genus, hispid above, harshly pubescent beneath; * lateral nerves 25-40, often almost horizontal, slightly arcuate; base acute; petiole winged, dilated at the base to clasp the stem. Flowers 1.5-2.2 in. across, appearing shortly before the leaves; pedicels 2-2.5 in. long, 3-bracteate about 1 in. above the base. Sepals concave, translucent, cohering at the base, nearly glabrous, palegreen. Petals .8-1.2 by 4-6 in. golden-yellow. Fruit globose, about .8 in. across, pale-green, with 5-7 carpels.

Foot of the MIKIR HILLS, Doigurung Reserve in SIBSAGAR; Chansiri Reserve also Sildharampur in NOWGONG.

Wood light reddish-brown, rather light, moderately hard, not much used. The fruit is eaten.

Fls. 3-5. Fr. 5-7.

Dillenia pentagyna, Roxb. Vern. Generally the same as of the preceding species. *Akshi*, *Okshi*, *Oua*, Ass.; *Tantri*, *Tatera*, Nep.; *Chirimpi*, Mik. *Boncholla*, Cach.; *Dieng-sah-bar*, Kh.

A deciduous tree about 50 ft. in height; branches generally ascending; branchlets marked with V-shaped leaf scars. Bark greyish-white outside, green underneath the corky layer, light red inside, finely purple-veined. Leaves 12-40 by 4-12 in., oblanceolate, very narrow at the base which is often stem-clasping, serrate, coriaceous and hard, glabrous above, glabrescent beneath; lateral nerves up to about 40, almost straight, making an angle of about

50 degrees with the midrib, tertiary nerves very fine, sub-parallel; petiole short or 0. *Flowers* about 1.5 in. across, in fascicles of 3-8 from short bracteate protuberances, appearing before the leaves; pedicels .8-1.5 in. long, without any bract. *Sepals* broadly ovate, concave, pale-green, glabrate, slightly ciliate. *Petals* about 1 in. long, obovate, light greenish-yellow. *Fr.* .6-.8 in. in diam., of 5 carpels (whence the specific name).

A characteristic tree of deciduous forests, therefore rather scarce in UPPER ASSAM, which area it just touches by occurring along the foot of the MIKIR HILLS, e.g., Luming, Barpathar, Kukrakata, etc.

Wood reddish-grey, moderately hard and fairly durable, but is liable to warp and crack, hence not much used. The fruit is eaten. In Western India the leaves are used as a substitute for thatching grass. They might be so used in parts of Assam also where thatching grass is scarce.

Figs. 3-5. Fr. 5-7.

FAM. 3. MAGNOLIACEÆ.

Trees, shrubs or climbers, more or less aromatic. *Leaves* simple, alternate, usually entire, generally with stipules which leave a transverse scar on the branchlets. *Flowers* solitary, generally showy. *Sepals* and *petals* similar, deciduous, arranged in whorls of 3. *Stamens* many. *Carpels* many, arranged often spirally on an axis which generally elongates as the fruit ripens.

1. Trees with large but caducous stipules. Carpels spirally arranged on an axis:

- A. Flowers terminal (axillary in *Talauma phellocarpa*) with little or no interval bet. stamens and carpels:—

Carpels persistent on the axis:—

Carpels separate, each with 2 ovules. ...

Carpels co-hering, each with 6 or more ovules. ...

Carpels separating from the axis, with 2 ovules in each. ...

Carpels confluent with 2 ovules in each cell. ...

- B. Flowers axillary with a distinct interval between stamens and carpels: ovules 2-6 in. each carpel.

- II. Shrubs without stipules.

Carpels in only one whorl, each with 2 or more

- III. Climbers without stipules. Carpels with 2 or more ovules:—

Carpels in fruit distant forming a long spike ...

Carpels in fruit closely packed forming a globose head. ...

1. *Magnolia*
2. *Manglietia*.

3. *Talauma*.
4. *Pachylarnax*

5. *Michelia*.

6. *Illicium*.

7. *Schizandra*.

8. *Kadsura*.

1. MAGNOLIA, Linn.

Generally trees. *Leaves* entire; buds enclosed in large convolute stipules which are connate in pairs. *Flowers* terminate usually large. *Sepals* 3, as a rule not brightly coloured. *Petals* 6-12, in series of 3. *Stamens* numerous, filaments flat, with little or no interval between them and the carpels. *Carpels* many, persistent 2-ovuled, the stigmas running down along their ventral

suture. *Fruit* with an elongated axis. *Seeds* pendulous with a long cottony cord, only.

Leaves large, generally 9-16 in. long, very closely reticulate, hairy at least when young :—

Leaves very coriaceous glabrous when mature, pet. long with a narrow V-shaped scar; sepals and petals broad. . . .

1. *M. pterocarpa*.

Leaves moderately coriaceous, felted-tomentose beneath; pet. short, channelled; sepals and petals narrow. . . .

2. *M. Griffithii*.

Leaves medium-sized, 6-9 in. long, chartaceous, generally glabrous :—

Leaves elliptic, glabrous and green beneath, petiole at least 1 in. long. . . .

3. *M. spiciocarpa*.

Leaves oblong, glabrous when mature, petiole scarcely 3 in. long. . . .

4. *M. Pealiana*.

Leaves small, 4-6 in. long, thinly chartaceous, quite glabrous, very closely reticulate, pet. short. . . .

5. *M. Gustavi*.

1. *Magnolia pterocarpa*. Roxb Vern. *Thouthua*, Ass. (N. Lakh.) *Baramphur-sopa*, Ass.; *Doloi-champa*, Cach; *Utham-ban*, Manip.; *Phapitenhaya*, Kuki; *Lairouthou-buphang*, Cach.; *Chapite-jamja*, Tipp. and Kuki; *Thang-Ksem*, Dieng-long-krop, Dieng-soh-wur-synring, Dieng-soh-dkhar, Khasi.

A middle-sized ever-green tree generally with a large crown, branchlets green, annulate. *Bark* grey, rough with warts, inside fibrous, light brown with distant white streaks, soon turning dirty-brown, 5-7 in. thick. *Leaves* 9-16 by 5-7 in., elliptic or obovate, very coriaceous, felted rusty-tomentose beneath while young, glabrous and shining above, young light-green, old pale-yellow; lateral nerves 20-25 on either side, raised underneath, tertiaries raised on both surfaces (rather depressed above when green), closely reticulated in crocodile pattern; base cuneate; petiole 1.2-2 in. long, flattened above with a narrow V-shaped scar; stipules 4-5 in. long, caducous, adnate by their edges to the petiole, greenish-white, grey-canescens, with a tuft of hairs at the apex. *Flowers* 3-6 in. across; buds ovoid, 2.2-2.5 by 1.5 in., enveloped in a concave coriaceous puberulous caducous bract, *Sepals* 3, 3 by 2 in., very concave, green outside, greenish-white inside. *Petals* 6, dull-white very fleshy but with a sharp margin, aromatic, gradually smaller but scarcely narrower inwards obovate, emarginate. *Stamens* very numerous with no interval between them and the carpels, together forming a continuous conical mass 1.5 by 1 in.; anthers long with purple tips. *Stigmas* feathery. *Fruit-spike* 6-10 by 2-2.5 in. *Mature carpels* with a recurved terminal wing 1.1-1.7 in. long; axis much thickened and somewhat spongy. *Seeds* orange.

North Lakhimpur and Charduar. Somewhat rare in Upper Assam but possibly generally mistaken for *Talauma Hodgsoni* which it closely resembles in foliage.

The wood is white, rather soft and even-grained and suitable for tea-boxes. It is considered excellent as fire wood in N. Lakhimpur. The stipules, while

tender, are chewed to blacken the gums and teeth in the same way as those of *Talauma Hodgsonii*.

Fls. 4-5. Fr. 10-12. L. renewal 10-12.

2. *Magnolia Griffithii*, Hk. f. & Th. Vern. *Gauri-sopa*, *Gahori-sopa* or *Bar-gahori-sopa* Ass. (Lakh. and Darr.); *Pansopa*, *Kola-sopa*. Ass. (Sibs.); *Lakap*, Naga.

A middle-sized tree with a more or less oval crown; branchlets thickly rusty-pilose. Bark grey, fairly plain but with shallow horizontal wrinkles and fine vertical fissures, dark-brown and fibrous inside, turning darker brown after exposure about .5 in. thick. Leaves 6-12 by 4-6 in., elliptic thinly coriaceous, glabrous and somewhat shining and very finely reticulate above, densely felted tomentose and often variegated beneath; lateral nerves 20-28 on either side, straight or very slightly arcuate, base gradually or suddenly cuneate, petiole .3-5 in. long, hairy channelled. Flowers about 6 in. across pale-white faintly scented; buds enclosed in silky scales 2 by .8 in., oblong silky on silky peduncles 1.2-1.8 in. long. Sepals 3. Petals 6, 2.5-3 by .8-3 in.; fleshy, brittle creamy-white or pale-yellow. Stamens about 90, crowded a little below the carpels which are adpressed in fl. and form a cylindrical column. Carpels about 110, styles slender and slightly recurved. Fruit-spike 5-10 by 1-1.2 in.; carpels speckled when mature, compressed, 1-2-seeded, scarcely woody; axis scarcely thickened. Seeds reddish-brown.

Fairly common in the evergreen forests of LAKHIMPUR, SIBSAGAR and DARRANG DISTRICTS.

The wood is greyish-brown, rather soft and light, not used for timber.

Fls. 4-5. Fr. 11-1.

3. *Magnolia sphenocarpa*, Roxb. Vern. *Pansōpa*, Ass. (Sibs.) *Parokbithi-arong*, Mikir.

An evergreen tree up to 70 ft. in height and 5 ft. in girth. Bark grey, fairly smooth, with very fine vertical fissures and shallow horizontal wrinkles, inside brown and mottled, soon turning dirty green, aromatic. Leaves 8-12 by 4-6 in., aromatic, elliptic, membranous, quite glabrous, shining above; lateral nerves 10-12 on either side with often a few intermediate ones, tertiaries finely and closely reticulate; base rather suddenly cuneate; petiole 1-1.2 in. long channelled swollen at the base, with no V-shaped scar; stipules about 2 in. long, hairy at the tip.

The above description refers to my No. 3887 which was identified at Sibpur as this species. Sir George King, however, has made *M. sphenocarpa* Roxb., synonymous with *M. pierocarpa* Roxb., but if the Sibpur identification of my specimen is correct, the two trees must be kept distinct. My specimen agrees exactly with Mr. Haines' No. 505 from Lower Tondou, W. Duars. Unfortunately I have seen no flower or fruit.

Barpathar, SIBSAGAR.

4. *Magnolia Pealiana*, King. Vern. *Gahori-sopa*, Ass. (Lakh.) Apparently a middle-sized tree; young shoots hairy. Bark

dark-grey with longitudinal wrinkles. *Leaves* 6-10 by 2-3 in., oblong or oblanceolate, suddenly acuminate, chartaceous, glabrous and shining above, pubescent on the midrib and nerves beneath; lateral nerves about 18 on either side often with shorter intermediate ones, reticulations much closer and finer than in the preceding species; base cuneate or rounded; petiole 2-3 in. long, channelled, stipules 1.25 in. long, strap-shaped with a subulate tip, pale-yellow, silky. *Flowers* solitary, leaf-opposed, 3-4 in. across, on a yellow-silky pedicel 1.5-2 in. long; buds oblanceolate in outline; involucre covered with yellow silky hairs. *Sepals* 3, oblong, coriaceous with undulate margins near the apex. *Petals* 6, oblong or oblanceolate, coriaceous, smaller than the sepals. *Stamens* 5 in. long; filaments about one-tenth the length of the sharply pointed anthers; gynæcium cylindrical with a short stalk above the stamens. *Fruit* 3-5 in. long; carpels 6 by 1.5 in., 2-seeded, slightly speckled outside.

Makum Forest, LAKHIMPUR. Mann.

The wood is white throughout, soft and even-grained, light but fairly strong.

5. *Magnolia Gustavi*, King. Vern. *Khorokia-sopa*, Ass. (Lakh.)

An evergreen tree 70 to 80 ft. in height and 5 to 6 ft. in girth, closely resembling *Talauma phellocarpa* in habit and foliage. *Leaves* 5-8 by 1.2-2 in., elliptic-lanceolate, acute, chartaceous, quite glabrous; main lateral nerves 14-16 on either side, reticulations very fine and close; base acute; petiole 3-5 in. long. *Flowers* 3-4 in. across, terminal and axillary, solitary, on peduncles 1.5-2 in. long; buds 1.5 in. long, oblong-ovoid; bracts ovoid, smooth, coriaceous. *Sepals* 3, oblanceolate, membranous. *Petals* 6, of the size and shape of sepals, coriaceous. *Stamens* about 6 in. long, not very numerous, with no interval between them and the carpels. *Carpels* sessile, suborbicular, smooth, dorsally compressed when young, 6-7 in. long when mature, not beaked. *Young fruit* club-shaped.

Makum Forest. LAKHIMPUR.

2. MANGLIETIA, Bl.

Some characters as of *Magnolia* excepting that the *leaves* are generally more laxly veined, the *gynophore* is always sessile, the carpels are more congested and cohering, and with 6 or more ovules in each carpel. Scar of stipules is always present on the petiole and is of the shape of a narrow U.

Large trees. Leaves at least thrice as long as broad, generally finely acuminate, pale beneath; petiole stout:—

Fruit-spike ovoid-oblong. Leaves lanceolate.
Fruit-spike globose-ovoid. Leaves oblanceolate. ...

1. *M. Caveana*.

2. *M. Hookeri*

Middle-sized tree. L. not more than twice as long as broad, obtuse or suddenly obtusely acuminate, glaucous beneath petiole slender.

3. *M. insignis*.

1. *Manglietia insignis*, Bl. Vern. *Pan-sopa Phul-sopa*, Ass. (Lakh. and Sibs.). *Dieng-rhi-basaw*, also *Dieng-rhi-balih*, Khasi; according as the flowers are pink or white.

An evergreen tree 80-90 ft. high and 5-7 ft. in girth. *Bark* plain, greyish white to reddish brown outside with faint vertical fissures and fine horizontal wrinkles, green underneath the thin layer of cork, fibrous, inside dirty-brown, faintly mottled, soon turning darker brown. *Leaves* 6-9 by 2-3 in., elliptic-lanceolate, generally thickly coriaceous, quite glabrous; main lateral nerves about 18 on either side alternating with shorter ones; main reticulation lax, raised on both surfaces in dry but impressed above in green leaves; base acute or cuneate; petiole 1-2-1½ in. long, more or less stout. *Flowers* 4-6 in. across scented. *Sepals* 3, 3 by 2 in., pink. *Petals* 9, white, gradually narrower towards the centre, very fleshy. *Anthems* sessile or nearly so. *Carpels* slightly beaked, warty, each with about 6 ovules. *Fruit* narrowly ovoid or almost cylindrical, 3-5 in. long. *Seed* red, faceted, suspended by a very slender cord.

Fairly common in evergreen forest along the foot of the Naga Hills in LAKHIMPUR to Geleki and in the Diroi Reserve in SIBSAGAR. Also near Gagaldhubi, in N. LAKHIMPUR, and Pabhoi in DARRANG; *KHASI HILLS* below 2,500 ft.

The wood is yellowish-white, even-grained and smooth and takes a very fine satiny polish. It is very good for indoor work.

Fls. 5-6. Fr. 910.¹

Var. 1. *LATIFOLIA*. Leaves shorter but rather broader than in the type, acute.

Occurs in the same localities and has the same vernacular names.

2. *Manglietia Hookeri*, Cubitt and Smith, Rec. Bot. Surv. Ind. IV. 273. Vern. *Pansopa*, *Phulsopa*, Ass. (Lakh. and Sibs.)

Apparently a large tree; young parts rufous-silky. *Bark* grey outside, fairly smooth, light brown and fibrous but soft inside, 7-9 in. thick. *Leaves* 6-8 by 2-2½, elliptic or oblanceolate, finely acuminate, membranous or very thinly coriaceous, minutely ferruginous-pubescent beneath when young, glabrous when mature; main lateral nerves 10-14 on either side, very slender, with a few more slender intermediate ones; reticulations inconspicuous in green, but distinct and slightly raised on both surfaces in dry leaves; base acute; petiole rather slender 1-1½ in. long; stipules 2-3 in. long lanceolate, brown-silky outside. *Flowers* 5-6 in. across, scented. *Sepals* 2½-3 by 8 in., oblanceolate, green tinged with pink. *Petals* white, soon turning pale-yellow. *Carpels* with 3-4 ovules. *Fruit* 2-3 by 1½-2 in., ovoid; carpels without beak.

Evergreen forests of LAKHIMPUR and SIBSAGAR from Makum to Sapakathi
Fls. and new lvs. 2-3 Fr. 6-7.

The heart wood is greenish-brown, fine and even-grained, fit for furniture and indoor work. It is said to be very durable.

3. *Manglietia Caveana*. Hk. f. and Th. Vern. *Pansopa*, *Phul-sopa*, Ass. (Lakh. and Sibs.); *Larsej-Kynthei*, Khasi.

Generally a middle sized tree with ashy-grey fairly smooth bark green underneath the corky layer, inside dirty-brown and faintly mottled, 3 in. thick. *Leaves* crowded at ends of branchlets, 4-9 by 2.2-3.5 in., broadly or oblong-elliptic, finely acute or bluntly acuminate, chartaceous, shining above, more or less glaucous beneath, main lateral nerves 10-15 on either side, almost regularly alternating with shorter intermediate ones slightly arcuate; midrib depressed above, prominent beneath reticulations close, distinct in dry, but somewhat indistinct in green leaves; base rounded or obtuse; petiole 1.3-1.5 in. long; stipules very sparingly rusty-silky pubescent. *Flowers* 4-6 in. across, scented. *Sepals* 3, dull-red with green veins, 2-3 in. long. *Petals* 9, gradually narrower, white, fleshy. *Anthers* sessile. *Carpels* congested, each with about 6 ovules, not or very slightly beaked when mature. *Fruit* narrowly ovoid; seeds faceted, red.

Jaipur and similar localities in LAKHIMPUR; Sapekathi and Abhaipur Reserve in SIBSAGAR; also KHASI HILLS upto 2000ft.

Wood appears to be soft, not used as timber.

Fls. 2-3. Fr. 6-7.

3. TALAUMA, Juss.

(Generally trees. *Leaves* entire; buds enclosed in large convolute stipules. *Flowers* terminal. *Sepals* 3. *Petals* in whorls of 3. *Anther* linear, introrse. *Gynophore* sessile. *Carpels* indefinite, each with 2-4 ovules, woody or corky when mature, finally separating from the axis; seeds suspended by an elastic cord.

Carpels not confluent, woody. *Leaves* glabrous.

Sepals and *petals* broad and fleshy:—

A small tree. *Sepals* and outer whorl of *petals* never fully expanded. ...

1. *T. Hodgsoni*.

A tall tree. *Sepals* and outer whorl of *petals* reflexed when flower is fully open. ...

2. *T. Rabaniana*

Carpels confluent externally, spongy. *Leaves* adpressedly grey-pilose beneath. *Sepals* and *petals* narrow, not fleshy. ...

3. *T. phillocarpa*.

1. *Talauma Hodgsoni*, Hk. f. & Th. Vern. *Boronthuri*, *Boronthuri*, Ass.; *Dat-bhola*, Ass. (Charduar); *Dieng-soh-pydem*, Khasi; *Tetere-asing*, Miri.; *Burbang-asing*, Abor. *Boron-thari-asing*, Mik.; *Laigerau*, Kach.; *Langungron*, Mech.

A small tree with a few spreading branches. *Bark* greenish-grey, warty, otherwise smooth, with distant horizontal wrinkles, often with large white patches; inside brownish-yellow, fibrous, 2-3 in. thick. *Leaves* 8-20 by 4-8 in., oblanceolate, rounded or suddenly apiculate, thinly coriaceous, quite glabrous, red and erect when young; secondary nerves 15-25 on either side, almost straight, tertiaries more or less transverse to the secondaries, quaternaries reticulate; base very acute; petiole 1-2.5 in. long, terete, with a faint scar of fallen stipules, much swollen at the base. *Flowers* large, terminal. *Sepals* greenish-purple. *Petals* greenish-white at base, bright-red above. *Filaments* short. *Fruit* ovoid, 4-6 by 2.5-3.5 in. *Carpels* beaked, woody, dehiscent by the ventral suture, separating from the axis leaving the red seeds

attached to it at the upper end of the empty pits by an elastic cord.

Fairly common in the evergreen forests of all the DISTRICTS of UPPER ASSAM.

The wood is grey, soft, light and even-grained.

It is used for handles of knives, etc., in Darjeeling, but only as firewood in ASSAM. The stipules are chewed by young girls to blacken their teeth and gums.

Fls. and new leaves 4-5. Fr. 8-9.

2. *Talauma Rabaniana*, Hk. f. & Th. Vern. *Sopa*, Ass.; *Lai-makhan-phang*, Kach.; *Kobaraiching*, Naga.

A tall tree with a conical crown attaining 70ft. in height and 6ft. in girth, closely resembling *T. Hodgsoni* in general appearance, young parts fugaciously tawny-tomentose. *Bark* 5-7 in. thick, dark-grey and rough outside, fibrous and uniformly pale-brown inside. *Leaves* 8-14 by 2-4 in., elliptic or oblanceolate, shortly acuminate, gradually narrowed to the base, coriaceous, dark-green and shining above light-green underneath; midrib stout; lateral nerves 12-24 on either half, nearly straight; reticulations fine and close. *Flowers* solitary, terminal, 2-3 in. long; peduncles about 1 in. long and 4-5 in. thick, annulate; bracts densely adpressed tomentose. *Sepals* 3, sub-orbicular, rough outside, caducous. *Petals* 9 in three whorls, broadly elliptic or obovate, concave, the outer whorl reflexed after the fall of the sepals. *Filaments* very short; anthers ½-7 in. long. *Fruit* about 3-6 in. long and 1½-1½ in. diam.; carpels not so numerous as in the last species, woody, dehiscent by the ventral suture; axis woody; pits somewhat shallow, rhomboidal.

GARO, KHASI and NORTH CACHAR HILLS upto 4,000 ft., also near Patgaon in GOALPARA.

The timber is greyish white and moderately hard, weighing about 30 lb. per c. ft. It is suitable for furniture and planking.

Fls. 4-6. (?).

3. *Talauma phellocarpa*, King. Vern. *Khorika-sopa*, *Titu-sopa*, Ass. (Lakh. & Sibs.); *Dieng-lari*, *Dieng-rewi*, Synt.; *Karo-phang*, *Dauthu-kundu-phang*, Kach.; *Champa*, Cach.; *Bol-mring*, Garo; *Langlu-chikong-arong*, Mik.

A large evergreen tree up to 100 ft. in height and 8 ft. in girth, with grey pubescent branchlets which are gracefully pendulous in mature trees; crown narrow and conical till full height is attained, oval afterwards. *Bark* ashy-grey, somewhat rough, exfoliating in rectangular flakes; inside fibrous, yellowish tan-brown, mottled with coarse strands of amber-brown, soon turning darker tan-brown, 4-5 in. thick, aromatic, bitter. *Leaves* 3-8 by 1½-2 in., elliptic lanceolate or oblong-lanceolate, acute or acuminate, thinly coriaceous, glabrous and shining above, densely grey-pilose beneath when young, glabrescent when mature, pale-yellow before falling; main lateral nerves about 14 on either half, slender, straight or more or less arcuate, reticulations very close

and fine, base acute; petiole 4-7 in. long, pubescent; stipules 4-6 in. long, brown-silky outside; scar inconspicuous. *Flowers* axillary, solitary, erect, pale-white, about 1 in. across; buds ovoid-elliptic, 5-7 in. long, enclosed in silky scales; peduncles 4-5 in. long, jointed about the middle. *Sepals* and *petals* 12, narrow-lanceolate to strap-shaped, pale-white. *Fruit-spike* continuous, 3-4 by 1-2-1-4 in., speckled with large grey corky lenticels, aromatic, somewhat bumpy indicating the position of the carpels which ultimately fall off leaving empty oval cavities and falcate stalks attached to the persistent axis.

Fairly common in the LAKHIMPUR and SIBSAGAR DISTRICTS from Makum to the Diroi Reserve; also found in the MIKIR HILLS and in the Dhansiri Reserve, NOWGONG; KHASI HILLS upto 4000ft; CACHAR and GARO HILLS.

The tree has a large heartwood of a greenish-brown colour turning darker brown when dry. It takes a good polish and is used for planking, doors and windows and furniture. Annual rings marked by a very fine ring of softer tissue.

Fls. 5-7. Fr. 7-9. Occasionally flowers and fruits out of season.

4. PACHYLARNAX, Dandy.

Pachylarnax pleiocarpa, Dandy. Sp. nov. Vern. *Phulsopa*, *Kothalpathia sapa*, Ass.

A large evergreen tree, young shoots dark green, tubercled. *Bark* rough with longitudinal furrows. *Blaze* brownish yellow marked with dark dots. *Leaves* alternate, somewhat crowded towards the ends of branchlets 6-9 by 2-3 in. elliptic oblong to oblanceolate oblong, entire, obtuse or rounded, rarely subacuminate, sometimes slightly emarginate, thickly coriaceous, shining, green above, pale beneath, glabrous; lateral nerves 10-18 on either half, conspicuous, midrib prominent beneath; nerves laxly reticulate, base cuneately attenuate, occasionally unequal; petiole 1-1-2 in. long, thick, flattened above (not channelled); stipules deciduous, elliptic oblong. *Flowers* fragrant, generally solitary, rarely in pairs, about 4 in. across; flower buds lanceoloid or narrowly ovoid oblong, covered by 1-3 deciduous bracts; peduncles thick, 8-1-2 in. long. *Permanth* 4-5-merous; tepals 13-15, fleshy, whitish yellow or cream coloured, 4-5 outer ones oblanceolate or narrow elliptic oblong, 9-10 inner ones spatulate, smaller towards interior. *Stamens* numerous (53-57), 5-8 in. long; filaments short; anther cells produced into a short acute appendix, gynoecium elipsoid; carpels concrescent, 5-8; ovules 4-8 in each carpel. *Fruit* capsular, woody, ellipsoid, 3-4 by 3 in., dorsally dehiscent, (upper most separating from the conical central axis), each valve being composed of united halves of 2 adjacent carpels. *Seeds* about 3 in. across; with an orange coloured fleshy coat.

LAKHIMPUR (Digboi, Upper Dehing and Jaipur Reserves).

Wood moderately hard, takes a fine polish and is very valuable for cabinet work.

Fls. 10-12. Ft. 8-9 (persists long on the tree).

E. Dandy in the *Journal of Botany*, November, 1935.)

5. *MICHELIA*. Linn.

Evergreen trees. *Leaves* enveloped by stipules in bud with prominent reticulate veins, generally bitter and aromatic. *Flowers* axillary (terminal in *M. Cathcartii*), solitary, with sepals and petals similar and in whorls of 3. *Filaments* flat, with a distinct interval above them and below the carpels, anthers introrse. *Carpels* terete or compressed, usually white-speckled, contiguous in flower but generally distant in fruit owing to elongation of the axis, dehiscent dorsally, each with 2-4 ovules, but mostly 1-seeded in fruit. *Styles* short.

I. Carpels numerous :—

A. Flowers mostly terminal.

Leaves 3-5 by 1·5-2 in.,
chartaceous, glabrous except
the midrib, lateral nerves
10-15 on either half. Fruit-
spike 3-5 in. long ; ripe
carpels compressed, congested.

... 1. *M. Cathcartii*.

B. Flowers axillary :—

1. Young parts hairy :—

a. Leaves more or less pubescent beneath. Young parts densely ferruginous-tomentose :—

Leaves 5-8 by 2-3·5 in.,
thinly coriaceous ; lateral
nerves 8-10 on either half.
Fruit-spike 5-8 in. long ;
ripe carpels terete, rather
distant. ...

... 2. *M. excelsa*.

Leaves densely grey-tomentose
beneath, 6-10 by 2-3·5 in.,
sub-coriaceous ; lateral
nerves up to 18 on each half.
Fruit-spike 2-5 in. long ;
ripe carpels compressed,
stalked. Flowers pale-white,
not scented. ...

... 3. *M. lanuginosa*.

Leaves usually puberulous
beneath, 8-10 by 2·5-4 in.,
thinly coriaceous ; lateral
nerves about 15 on either
half. Fruit-spike 4-8 in.
long ; ripe carpels terete,
sub-sessile, rather distant.
Flowers pale-yellow, strongly
scented. ...

... 4. *M. Champaca*.

b Adult leaves glabrous :—

Leaves 2·5-6 by 1·5-3 in.,
chartaceous ; lateral nerves
10-15 on either half, slender.
Fruit-spike 2-4 in. long ;
ripe carpels much compressed,
orbicular, sessile. Flowers
pale-yellow, delightfully
scented. ...

... 5. *M. Kisopa*.

Leaves 3-6 by 1·5-2 in.,
thinly coriaceous ; lateral

nerves 8-12 on either half.
Fruit-spike 2-4 in. long;
ripe carpels compressed,
obovoid

... 6. *M. punduana*.

2. All parts glabrous:—

Leaves 3·5-5 by 1·5-2·5 in.,
thinly coriaceous. Fruit-
spike 5-7 in. long; ripe
carpels terete obovoid
sessile, somewhat distant.

7. *M. oblonga*.

Leaves 5-7 by 3·5-4·5 in.,
coriaceous, strongly reticu-
late. Fruit-spike 5-7 in.
long; ripe carpels terete,
oblong, slightly apiculate

8. *M. Mannit*.

II. Carpels few:—

Leaves 4-6 by 1·5-2·2 in.,
oblong-lanceolate, coriaceous,
glabrous, glaucous beneath;
lateral nerves 9-11 on either
half. Fruit-spike 2-4 in. long,
ripe carpels slightly com-
pressed, shortly beaked.

9. *M. manipurensis*.

Leaves 3-7·5 by 1·5-4 in., lanceolate,
thinly coriaceous, shining above, closely
but not very strongly reticulate; lateral
nerves 10-12 on either half. Fruit-spike
1·7-2 in. long; ripe carpels usually
only one, as long as the fruit,
obovoid, not terete.

... 10. *M. montana*

1. *Michelia Cathcartii*, Hk. f. & Th. Vern. *Dieng-rai*, Kh.

A large evergreen tree; young branches silky-hairy; bark dark-grey. *Leaves* 3-5 by 1·5-2 in., lanceolate or oblong-lanceolate acuminate, more or less rounded at the base, quite entire, chartaceous, shining on both surfaces; midrib densely silky-hairy above, brown-pilose beneath; lateral nerves 10-15 on either half, very slender, tertiaries finely reticulate; petiole 2-3 in. long, slender, densely yellow-hairy; stipules 6-8 in. long, densely silky. *Flowers* white, mostly terminal, 3-4 in. diam.; buds oblong, rounded at both ends; peduncle 1 in. long. *Sepals* and *petals* 9 in 3 whorls, each 1·5-2 in. long. *Stamens* about 1 in. long, overtopping the carpophore; filaments one-fourth the length of the anthers. *Carpels* sessile, beaked and densely imbricate while young. *Fruit-spike* 3-5 in. long; ripe carpels 3-4 in. diam., sub-orbicular, compressed, closely lenticellate; seeds 2-3.

KHASI HILLS, e.g., Nong-ryng-koh. Also NAGA HILLS.

Wood compact and moderately hard, fit for planking and tea-boxes, weighing about 40 lbs. per c. ft. Annual rings distinct.

Fls. 3-5. Fr. Rainy season.

2. * *Michelia excelsa*, Bl. Vern. *Dieng-rai*. Khasi.

A lofty deciduous tree. *Bark* 7 in. deep, dark-grey, corky outside with irregular lines of fat lenticels and with very fine horizontal wrinkles, inside uniformly dun-yellow but for a few deep-brown specks; fibres very fine. Young parts densely ferruginous-tomentose. *Leaves* 5-8 by 2-3·5 in., ovate-elliptic or oblong-lanceolate, acuminate, cuneate or lightly rounded at

the base, thinly coriaceous, glabrous and shining above, glaucous often minutely silky-puberulous underneath; lateral nerves 8-10 on either half, arched, tertiaries very closely reticulate; petiole .5-1 in. long; stipules 1.5-2 in. long oblong-acuminate, silky outside. *Flowers* white, axillary, sometimes spuriously terminal, 3-4 in. diam, faintly scented. *Sepals* and *petals* 12, of the outermost whorls 3 by 13 in., gradually narrower towards the centre. *Stamens* about 50, shorter than the gynœcium; filaments .1 in. long. *Carpels* about 40, tipped with persistent recurved styles. *Fruit-spike* 5-8 in. long; ripe carpels .4-6 in. long, obliquely ovoid, shortly beaked; ovules 2-4 in each carpel, fascicled on a tubercle on the placenta, only 1-2 developing into seed in each ripe carpel, seeds red, faceted, oily.

KHASI HILLS, e.g., Lum-suair near Dampet and similar other localities —not common.

Sapwood small, white, soft: heartwood yellow when freshly-cut, afterwards turning brown. Medullary rays very numerous, mostly very fine, showing a satiny silver-grain on a radial surface. Weight about 35 lbs. per c. ft. The timber is remarkably durable and is very suitable for furniture and planking.

Fls. 4-5. Fr. Rainy season.

3. *Michelia lanuginosa*, Wall. Vern. *Dheng-lali*, Khasi; *Gogoi-champ*, Nep.

A fast-growing deciduous tree up to 90 ft. in height and 7 ft. in girth with a broad crown. *Bark* about 1 in. thick, rather plain, grey corky outside, dun-brown inside, the whole soon turning on exposure to deeper brown, very fibrous. Young parts including stipules and bracts covered with pale grey-tomentum. *Leaves* 6-10 by 2-3.5 in., oblong-lanceolate acute at both ends or sometimes more or less rounded at the base, thinly coriaceous, glabrous and somewhat shining above, mattedly grey-tomentose beneath, turning yellow before falling; lateral nerves 14 to 17 on either half, slender, reticulations very close but distinct only on the upper surface; petiole .5-7 in. long, rather short, grey-tomentose; stipules oblong. *Flowers* pale-white, 2.5-3 in. diam., axillary, solitary on short stout hairy pedicels; bracts very densely grey-silky. *Sepals* and *petals* 1-1.5 by .2-.3 in., oblanceolate. *Stamens* 60-70, much shorter than the gynœcium; filaments glabrous. *Carpels* about 45, very woolly; styles glabrous. *Fruit-spikes* 2-5 in. long; ripe carpels about .5 in. diam., shortly stalked, slightly compressed, densely lenticellate; seeds 1-3, faceted, deep-orange.

KHASI HILLS, 5,000 ft., e.g., Kynshi. Not very common.

Wood greyish-white, soft, weighing 30-35 lbs. per c. ft. Medullary rays fine and numerous. Might be used for planking.

Fls. 8-9. Fr. 9-11.

4. *Michelia Champaca*, Linn. Vern. *Champa*, Beng. & Hind.; *La-champa*, Synt.; *Tita-sopa*, Ass.; *Champari-phang*, Kach., *Serjo-asing*, Miri; *Bol-nabat*, Garo; *Ching-kappa*, Naga.; *Shap*, Khasi

Usually a middle-sized evergreen tree up to about 70ft. in height. *Bark* ashy-grey or brownish, rather rough outside, inside light dun-brown with thick strands of amber brown tissue, soon turning reddish brown, .5-.7 in. thick. *Leaves* 4-9 by 2-3.5 in., lanceolate, sometimes ovate, finely acuminate, thinly coriaceous, glabrous and more or less shining above, glabrescent underneath with usually some pubescence at least along the nerves; lateral nerves about 16 on either side of the midrib with often a few intermediate ones, slender but conspicuous, tertiaries finely reticulate in square or rectangular pattern; base very gradually cuneate; petiole .7-1.2 in. long, slightly channelled, usually pubescent; leaf-buds lanceolate, ferruginous-pubescent outside; old leaves yellow. *Flowers* axillary, rarely terminal, solitary, 1.2-1.8 in. long, pale-yellow to deep dun-yellow, very fragrant; buds ovoid; bract spathoid, broadly ovate, about 1 in. long, as broad as, or broader than long, often silky outside. *Sepals* and *petals* 15-21, oblong or oblanceolate, gradually narrower towards the centre. *Fruit-spike* 3-6 in. long; ripe carpels .6-8 in. long, ovoid or ellipsoid, generally sessile, white-speckled, woody when dry.

Occurs sporadically in all DISTRICTS generally along the foot of the HILLS, but not at all common. Much cultivated for its flower.

Heartwood light olive-brown, very durable, seasons and polishes well, useful for cabinet work and building.

Fls. 4-6. Fr. 4-6. of the following year.

5. *Michelia Kisopa* DC. Vern. *Chubsi*, Nep.

A tall deciduous tree with plain grey bark and thin lenticelled branchlets. *Leaves* 9.5-6.5 by 1.5-3 in., ovate, elliptic, oblong-or elliptic-lanceolate, acute or shortly acuminate, abruptly cuneate, rarely rounded at the base, thinly coriaceous, glabrous on both surfaces, shining above, dull underneath, turning yellow before falling; lateral nerves 10-15 on either half, only slightly arched towards the outer extremities; reticulations very close and fine; petiole .8-1.5 in. long, rusty-puberulous when young, stipules .6 in. long, oblong, grey or rusty-pubescent outside. *Flower* pale-yellow, axillary, shortly-stalked, 1-1.5 in. diam., delightfully scented; buds .5 in. long; bracts 2, fleshy, grey-pubescent outside. *Sepals* and *petals* 12-15, obovate or oblanceolate, glabrous. *Stamens* shorter than the gynoecium. *Carpels* silky-hairy; styles recurved. *Fruit-spikes* 2-4 in. long; ripe carpels sessile, .3-.4 in. diam., compressed, closely lenticelled; seeds 3-4.

Cultivated at Shillong.

Wood yellowish, suitable for use as door-frames and planking.

Fls. 7-9. Fr. 11-1.

-6. *Michelia punduana*, Hk. f. & Th. Vern. *Dieng-rtiang-khlaw*, Synt.; *Dieng-soh-niar*, *Dieng-rai*, Khasi.

A middle-sized tree; young parts densely red-silky. *Bark* grey, .5-.7 in. thick, thinly corky and with horizontal wrinkles outside, inside aromatic, granular yet fibrous, hard, brown,

mottled with coarse streaks of darker brown, soon turning uniformly deep-brown after exposure. *Leaves* 3-6 by 1·5-2 in. oblong, elliptic, obovate or oblanceolate, abruptly acuminate, base acute or cuneate; coriaceous, glabrous on both surfaces, shining above, pale or sub-glaucous beneath; lateral nerves 8-12 on either half, obscure, reticulations open, visible on both surfaces; petiole 5-75 in. long, rather stout; stipules about as long as the petiole, narrowly oblong. *Flowers* axillary, solitary, rarely in pairs, 1·3-1·5 in. across, on short, thick, rufous stalks; buds 5-7 in. long, ovoid, sharply pointed densely rufous-velvety. *Sepals* and *petals* 9-12, white, of the outer whorls obovate-cuneate, of the inner narrowly oblanceolate, pointed, not much scented. *Stamens* about 80, slightly shorter than the gynœcium. *Carpels* about 50, beaked. *Fruit-spike* 2-4 in. long; ripe carpels 3-4 in. diam., obovate or sub-globular, compressed, lenticellate, not beaked; seed solitary, aromatic with a scarlet arillus and black testa.

Appears to be confined to the KHASI HILLS, 4-5,000 ft., e. g., Cherapunji lawai, Jarain, etc.

Wood of a dull grey colour, compact, even grained, little liable to warp or split, weighing about 37 lbs. per c. ft., capable of being used for planking and furniture. Medullary rays close and uniform.

Fls. 10-11.

7. *Michelia oblonga*, Wall. Vern, *Phul-sopa*, *Bor-sopa* Kothal-sopa, Ass.; *Dheng-ta-roi*, Khasi; *Chamti-ver-ang*, *Bewo-chhamphe*. Garo: *Serio asing*, Miri & Abor.

A lofty tree up to 150 ft. in height, generally buttressed at the base. *Bark* grey, rough and warty outside, more or less plain and with horizontal wrinkles on young trees, green below the corky layer, inside light-brown with close and reticulating streaks of darker brown, turning dirty brown on exposure (when the streaks become invisible), 7-1·5 in. thick, aromatic. *Leaves* 3·5-7 by 1·5-2·7 in., oblanceolate, sometimes ovate, suddenly shortly acuminate, thinly coriaceous, shining above, pale and often glaucous beneath, turning yellow before falling; lateral nerves 10-12 on either half, sometimes with shorter intermediate ones; tertiaries laxly reticulate, the reticulations being conspicuous on both surfaces on dry leaves; base acute; petiole 6-1 in. long, rather slender, channelled, slightly swollen at the base; stipules narrow-oblong, as long as the petiole. *Flowers* white, scarcely scented, axillary, solitary, on short annulate peduncles; buds 8-1 in. long, elongate-ovoid. *Sepals* and *petals* 12 in all, white, fading to pale-yellow, 1-1·5 in. long, oblanceolate or spatulate. *Stamens* about 50; filaments 1 in., anthers 6-8 in long, turning brown after opening. *Carpels* about 40, glabrous, generally 4-ovuled. *Fruit-spike* 6-7 in. long; ripe carpels lax, sessile, obovoid, terete, speckled, upto 8 in. in length.

Fairly common in evergreen forests excepting NOWGONG, KAMRUP and GOALPARA: also in the GARO and KHASI HILLS.

Timber greyish-white with greenish grey, very fine-grained with close uniform medullary rays; weight about 40 lbs. per c. ft. Much prized for planking and cabinet work, as it does not warp or split.

Fls. 2-3. Fr. 8-10,

8. *Michelia Mannii*, King. Vern. Kothalua-sopa, Ass. (Lekh.)

A middle-sized evergreen tree, wholly glabrous; branches lenticelled. *Leaves* 4-7 by 2-4 in., oblanceolate to obovate with a subacute apex, firmly coriaceous, glabrous, shining above somewhat dull underneath; lateral nerves rarely more than 10 on either half, tertiaries conspicuously but broadly reticulate; base acute; petiole .8-1.2 in. long finely channelled, swollen at the base; stipules narrowly oblong, smooth. *Flowers* white, axillary, solitary, 2.5-3 in., across, on short peduncles; buds 1.2 in. long, oblong, smooth. *Sepals* 3, .6-8 by .1-1.5 in., linear. *Petals* 6, oblanceolate, in two series those of the inner series slightly smaller. *Stamens* as long as, or overtopping the gynoecium. *Carpels* sessile, smooth; style short. *Ripe-fruit* 5-7 in. long, with a fleshy rachis; ripe carpels up to an inch in length, oblong or obovoid, sparsely lenticellate, 2-seeded.

Makum Forest Range, LAKSHIMPUR DISTRICT, not very common.

Nothing is known about the quality of the timber, but it is likely to be as useful as most of its other co-geners.

Fls. 11-12. Fr. 4-5.

9. *Michelia manipurensis*, Watt. Mss. ex. Brandis Ind. Trees Vern. Dieng-rai Khasi; Sopa, Ass.

An imperfectly known middle-sized evergreen tree, young parts rufous-silky. *Bark* grey-corky outside with vertical lines of larger lenticels, soft inside white mottled with brown specks, turning uniformly brown on exposure .3-4 in. thick, not bitter. *Leaves* 3-7 by 1.5-2.3 in. oblong or oblong lanceolate, acuminate, cuneate at the base, coriaceous, glabrous, not particularly shining above, dull or sub-glaucous beneath, lateral nerves 10-12 on either half, conspicuous underneath, reticulations fairly close, equally distinct on both surfaces; petiole .75-1.2 in. long, margined. *Flowers* axillary, solitary, shortly stalked; buds about 1 in. long, lanceolate in outline, apiculate, slightly falcate, densely silky-rufous outside. *Fruiting-spike* 2.5-4 in. long; ripe carpels few generally at the extremity of the spike, with many barren carpels below, and sometimes with a few between them, .35-.4 in. diam., sub-globose compressed, beaked, lenticellate.

SIBSAGAR-Baruasali; LAKHIMPUR; KHASI HILLS upto 6000 ft. e, Lum Suar,

Timber not seen,

Fls. Oct. Fr. remains fully a year on the tree.

10. *Michelia montana*, Bl. Vern. Pan sopa, Ass. (Sibs.)

A fairly large evergreen tree. *Bark* grey outside, smooth but with close horizontal wrinkles, inside dark-brown, fibrous and much mottled, aromatic. *Leaves* 3.5-7.5 by 1.3-3 in., ovate elliptic or obovate, somewhat suddenly acute coriaceous, glabrous

and shining on both surfaces; main lateral nerves 9-11 on either half, slender, often with a few intermediate ones between. Tertiary veins closely reticulate and distinct on both surfaces (at least on dry leaves); base cuncate; petiole 7-1 in. long, slender, finely channelled, slightly swollen at the base. Flowers white, axillary, solitary or sometimes 2 from a short peduncle; pedicels slender, 8-1 in. long; buds cylindrical. Sepals and petals about 8, 8-1 in. long, oblanceolate or linear. Stamens overtopping the velvety gynoecium of 2-4 carpels. Ripe carpels 1-3, 2-2.5 by 1.2-1.5 in., obovoid, sessile or shortly stalked, woody, speckled with large white lenticels; seeds 3-4, 5 by 3 in., reddish-brown, faceted, suspended by an elastic cord.

Makum Range, LAKHIMPUR; CACHAR-Owden! Cultivated at Jorhat. Apparently not very common. Mann's Longai specimens are probably not this species.

The timber is probably as good in quality as of most other species of the genus, although not much known owing to the scarcity of the tree.

Fls. 7-9. Fr. 8-9 of the following year.

1. *Michelia excelsa*, Bl. and *M. manipurensis*, Watt, have been reduced to *M. doltsopa*, Buch-Ham. by Dandy (Journal of Botany Vol. LXV (1927) P. 277-279).

It is possible that an allied species which is not covered by this, exists, in N. E. Frontier District and Manipur which further field observations may bring to light.

2. *Michelia Kingii*, Dandy.

Dandy maintains (Journal of Botany, Novr. 1928) that the Indian plant included under this name is a new species, and describes it under the above name. He has drawn up the following key for separating it from *M. montana* proper:—

Tepals sub-similar in texture, all rather fleshy;
penultimate bract inserted well below the
middle of the peduncle; valves of mature
fruiting carpels not very convex outside. . . .

M. Kingii

Tepals very dissimilar in texture, those of the
outer whorl membranous, those of the inner
two whorls fleshy; penultimate bract inserted
usually about half way up the peduncle;
valves of mature fruiting carpels convex outside. . . .

M. montana.

Michelia Wardii, Dandy. A large tree. Leaves about 6.2 by 1.5 in. oblanceolate, narrowly oblong to elliptic oblong acuminate or sometimes acute, glabrous above, undersurface glaucescent and glabrous to thinly adpressed pubescent on the nerves, base decurrent into the petiole which is up to about 5 in. long; stipules adpressed grey tomentose or pubescent outside. Spatheoid bracts, grey, sericeo-tomentose, peduncles thick, 2-2.5 in. long. Perianth cream coloured, 1.75-2.5 in. long, segments 9-12, pubescent outside. Carpels numerous adpressed pubescent at least when young.

Allied to *M. excelsa*, Wall, and *M. manipurensis*, Watt., from which it differs by grey indumentum of the stipules, spatheoid bracts and peduncles grey, and the narrower leaves, and the absence of many or rufous hairs which are conspicuous in the earlier species.

Chibaon-Delei valley.

6. ILLICIUM, Linn.

Illicium Griffithii, Hk. f. and Th.

A large aromatic evergreen shrub 10-15 ft. high, without stipules; branches somewhat angular, glabrous, shining. *Leaves* 2-4 by 8-17 in. ovate, elliptic or lanceolate, shortly acuminate, acute at the base, coriaceous, glabrous, pellucid-dotted, shining above, dull-brown beneath, margins slightly recurved; lateral nerves 6-7 on either half, very obscure; petiole 4-6 in. long, channelled. *Flowers* axillary or terminal, solitary, about 1 in. in diam.; pedicels 5-1 in. long, recurved. *Sepals* 4-6, orbicular, acute. *Petals* 12-20, orbicular, not pointed, fleshy. *Stamens* 20-24, erect; filaments very short; anthers broad, blunt. *Carpels* about 20, in a single whorl, 1-ovuled with recurved styles. *Fruit* of spreading compressed beaked follicles; ripe carpels 8-12; seeds about 2 in. diam., sub-rotund, slightly compressed, glossy-brown.

KHASI HILLS. 4,500-5,500 ft., chiefly in gorges and deep ravines at Cherpunji and its neighbourhood.

The fruit is aromatic and has carminative properties.

Fls. Rainy season. Fr. Oct.

7. SCHIZANDRA, Michaux.

Sinistrorsely climbing glabrous shrubs. *Leaves* exstipulate. *Flowers* axillary, 1-sexual and dioecious, white, yellow or red. *Sepals* and *petals* 9-12, imbricate, generally in 3 series. *Stamens* 5-15 or more, spirally arranged; filaments monadelphous and short, or connate into a fleshy tube; anthers free, or sessile and half-buried in the head of connate filaments, cells small, remote. *Carpels* many, densely imbricated; stigma sessile; ovules 2, pendulous. *Fruit* an elongated spike of 1-seeded, rarely 2-seeded carpels; seeds albuminous.

Filaments free above; anthers free:—

Pedicels slender, 1-2.5 in. long. ... 1. *S. elongata*.

Filaments in one globose mass; anthers sessile:—

Pedicels stout 2-7 in. long:—

Branchlets verrucose, rather thick. ... 2. *S. Propinqua*.

Branchlets plain, thin. ... 3. *S. axillaris*.

1. *Schizandra elongata*, Hk. f. and Th. Vern. *Soh-mijarian*, Khasi.

A deciduous woody climber; branchlets thin, lenticelled, scaly at the base. *Leaves* 1.5-3.5 by .7-1.5 in., ovate or oblong-lanceolate, membranous, rather soft, glabrous above, minutely verrucose and sub-glaucous underneath, margins cartilaginous, with or without minute, distant, cartilaginous teeth; base acute or rounded, somewhat unequal; main lateral nerves 4-6 on either half, oblique, arched, reticulations open, faint; petiole .6-8 in. long, slender, channelled above. *Flowers* yellowish; .5-.7 in. diam.; pedicels 1-2.5 in. long, slender. *Sepals* 3, orbicular, green outside, yellow within. *Petals* 6, ovate-orbicular, larger than the sepals. *Stamen*

spirally arranged; filaments monadelphous below, free and tubular above; anthers with a thick connective. *Carpels* 20-24, imbricated on a conical receptacle. *Fruit-spike* 2-3 in. long, rachis slender at the base, swollen at intervals above; ripe carpels sessile, globose, not beaked.

KHASI HILLS, 5,-6,000 ft., e. g., Shillong Peak, Elephant Falls. etc.

Fls. 5-6. Fr. 8-9.

2. *Schizandra propinqua*, Hk. f. and Th.

A woody climber; stem dark-brown; branchlets succulent, brown, verrucose and lenticellate. *Leaves* 3-6 by 1-2 in., ovate-lanceolate, acuminate, somewhat fleshy and soft, glabrous, dark-green and shining above, pale and minutely gland-dotted underneath, margins with minute distant gland-teeth; base cuneate or more or less rounded, slightly unequal; lateral nerves 8-12 on either half, arched, not prominent, reticulations open, obscure; petiole .4-.6 in. long, rather stout. *Flowers* .5-.9 in. diam., yellowish, axillary, solitary, slightly scented; pedicels .4-.7 in. long, stout, minutely bracteolate. *Sepals* and *petals* ovate or obovate, concave in bud. *Filaments* connate into a globose brick-red fleshy mass, about .3 in. diam., anthers 12-15 or more, embedded in the mass of filaments. *Fruit-spike* 4-6 in. long, with a fleshy cylindrical rachis; ripe carpels globose, shortly stalked, baccate, 2-seeded.

KHASI HILLS, e. g., Laitkor Forest, 5,200 ft. Rather scarce.

Fls. 8-9. Fr. 10-11,

3. *Schizandra axillaris*, Hk. f. & Th.

A slender woody climber; old stems with thick corky reticulations, branches lenticellate, branchlets plain, angular. *Leaves* 2.5-4 by .8-1.3 in., narrowly oblong-lanceolate, long-acuminate, minutely gland-toothed at irregular intervals along the margins, tapering at the base, thinly coriaceous and somewhat succulent, glabrous, deep green above, pale beneath; lateral nerves 6-8 on either half, slender, reticulations very open, faint; petiole .4-.6 in. long, narrowly margined. *Flowers* dull-scarlet, axillary, solitary, about .5 in. diam., sessile, or on short bracteolated pedicels. *Sepals* orbicular, rather fleshy, concave. *Petals* ovate. *Stamens* as in *S. Propinqua* but generally with fewer anthers. *Fruit-spike* 1-2 in. long; ripe carpels sub-sessile globose. 1-2-seeded.

KHASI HILLS, 4,-5,000 ft.; ravines near Shillong, not at all common.

Fls. 7-9. Fr. 10-11.

Schizandra sphenanthera, Rehd & Wils. A large glabrous rambling shrub. *Leaves* 2.7-3.7 by 1-2 in., ovate or ovate-elliptic, acuminate distantly lenticulate, base broadly cuneate, often unequal, membranous main lateral nerves 6-8 on either half; petioles .5-1 in. long. *Flowers* deep cherry red, about .7 in. across, pedicels slender axillary 1-1.7 in. long, outermost perianth segments much smaller than the inner ones. *Fruit* in short compact purple hanging spikes—*Kingdon Ward*.

· Mishmi Hills--Delei Valley, Kingdon Ward. A Chinese plant.

8 KADSURA, Kæmp.

Kadsura Roxburghiana, Arn. Vern. *Mi-ja-ngeir*, Khasi ; *Kang-ma-ri*, Manip.

A woody evergreen climbing shrub ; branches generally with elongated lenticels. *Bark* on old stems grey-corky and deeply reticulately furrowed ; pith large. *Leaves* 3-6 by 1·3-2·4 in. elliptic to ovate-lanceolate, acute or shortly acuminate, distanty, dentate-serrate on young plants, entire on mature ones, soft and rather fleshy when fresh, but membranous when dry, quite glabrous ; main lateral nerves 10-12 on either half, often with shorter intermediate ones between, tertiaries obscure on fresh leaves but fairly distinct on the under surface of dry leaves, reticulations with large meshes ; base subacute ; petiole 6-8 in. long, slender, sharply margined ; stipules 0. *Flowers* 1-sexual, whitish, axillary, solitary, about 5 in. across, on peduncles 3-5 in. long, with as many as a dozen ciliate bracteoles, the uppermost passing into the sepals, elongating as the fruit matures to about 1 in. *Sepals* and *petals* 12, the largest 25 in. long, orbicular. *Stamens* about 12 ; outer filaments free, inner connate. *Carpels* many, imbricated ; stigma sessile ; ovules 2. *Ripe fruit* 1-1·5 in. diam., globose ; ripe carpels 3 in. long, oblong and faceted, red, juicy, more or less coalescing, shortly mucronate. seeds orbicular, compressed. The fruits sometimes run into galls which assume the shape and size of small plantains.

Jaipur Reserve in LAKHIMPUR ; Diroi Reserve and Garampani, SIBSAGAR, Charduar Reserve (Belsiri), DARRANG ; also KHASI HILLS. Not rare, neither abundant.

Figs. 9-10. Fr. 10-11.

Magnolia globosa, HK, f. & T. A small tree, branchlets deciduously silky pubescent with reddish brown hairs. *Leaves* 5-8 by 2·7-5 in. ovate or elliptic acute or obtuse, and mucronate, base rounded or subcordate, thin or subcoriaceous, glabrous above, except the puberulous midrib, glaucous and pubescent beneath on the nerves, main lateral nerves 8-10 on either side ; petiole 1-1·75 in. rufous tomentose like the stipules which are about 1·5 in. long. *Flowers* white solitary, 4-5 in. across each covered by a spatheoid caducous rufous tomentose bract ; pedicels stout, leaf opposed up to 25 in. long. *Sepals* and *petals* 3 ovate, the latter smaller. *Ripe fruit* 1·5-2·7 in. long ; oblong or ovoid cylindric ; carpels with short recurved deciduous beaks.

Mishm—Delei valley, 9000 ft. Kingdon Ward.

FAM. 4. ANONACEÆ.

Trees or shrubs, erect or climbing, sometimes aromatic. *Bark* usually with layers of anastomosing fibres inside, of branchlets marked by close reticulated longitudinal ridges. *Leaves* alternate, bifarious, simple, entire, exstipulate. *Flowers* 3-numerous, usually 2-sexual. *Sepals* 3, usually valvate. *Petals* 6, in two series, or the inner obsolete. *Stamens* usually numerous, seated with the ovaries in the centre on a more or less conical or convex

torus ; anthers 2-celled, sessile or subsessile, extrorse, connective enlarged or dilated. *Carpels* 1-celled, generally numerous and hairy. *Fruit* of numerous dry or succulent carpels on stalks which elongate as the fruit ripens, rarely united into a fleshy berry-like fruit. *Seeds* large with a hard shining testa and ruminated albumen.

I. TREES OR ERECT SHRUBS :—

A. Outer petals more or less flat, valvate :—

1. Petals uniform, flat :—

Ripe carpels baccate, with one basal seed.

Ripe carpels indehiscent with many ventral seeds and constrictions between them.

1. Polyalthia.

2. Unona (partly)

2. Petals subequal :—

a. Ripe carpels 6 or more usually with one sub-basal seed :—
Inner petals concave at the base, not clawed nor arching.

3. Popawia.

b. Ripe carpels many :—

i. Inner petals clawed and arching :—

Ripe carpels 1-seeded.
Ripe carpels with 2 or more seeds in two series.

4. Goniothalamus

5. Mitrephora.

ii. Inner petals saccate at the base (in the species here described), not clawed.

6. Alphonsea

c. Ripe carpels usually solitary, berries, many seeded. Petals saccate at the base.

7. Cyathocalyx.

3. Petals very dissimilar, valvate, outer small sepaloïd, inner much larger, flat. Ripe carpels generally 1-2 seeded.

8. Miliusa.

B. Outer petals, thin, imbricate, subequal. Ripe carpels 3 or more, 1-seeded in fruit.

9. Sageræa.

C. Outer petals triquetrous, valvate. Ripe carpels many, confluent into a many-seeded berry-like fruit.

10. Anona.

II. CLIMBING OR STRAGGLING SHRUBS :—

A. Petals imbricate in bud. Ripe carpels with 2 rows of seeds.

11. Uvaria.

B. Petals valvate in bud :—

1. Ripe carpels constricted between the single row of ventral seeds.

12. Unona (partly)

2. Ripe carpels not constricted :—

Petals nearly equal, concave and conniving at base. Flowers on hooked peduncles.

13. Artabotrys.

b. Outer petals larger than the inner.

Outer petals thin and flat
(in the species described here).
Carpels 1-seeded.

14. Oxymitra.

All petals thick and concave. Carpels with 2 or more seeds.

15. Melodorum.

1. POLYALTHIA, Bl.

Trees or shrubs, erect in all Assam species. *Flowers* axillary or leaf-opposed, bracteate, solitary or in few-flowered fascicles from axillary tubercles. *Sepals* 3, valvate or sub-imbricate. *Petals* 6 in two series, ovate or linear, flat or the inner slightly vaulted. *Torus* convex. *Stamens* cuneate; anther-cells remote. *Carpels* indefinite; ovules 1-2, basal or sub-basal. *Ripe carpels* berry-like, 1-seeded.

- I. Flowers 1·5 in. or more in diameter :—
 A. Flowers fascicled or umbelled. Petals linear, yellowish green :—
 Leaves narrow-lanceolate and taper-pointed with wavy edges. ... 1. *P. longifolia*.
 Leaves ovate-oblong with even edges. ... 2. *P. simiarum*.
 B. Flowers solitary or in pairs. Petals broadly lanceolate, white or pale-yellow. ... 3. *P. Jenkinsii*.
 II. Flowers under 1 in. in diameter :—
 Sepals scarcely shorter than the petals. ... 4. *P. cerasoides*.
 Petals greenish-white. ...
 Sepals much shorter than the petals. ... 5. *P. suberosa*.
 Petals red, ...

1. *Polyalthia longifolia*, Benth. and Hk. f. vern. *U'uboi*, Ass.; *Debdaru*, Beng.

A handsome evergreen tree with a conical crown and dark greyish-brown bark. *Leaves* 3·5-9 by 1·5 in., narrowly lanceolate, taper-pointed, rather membranous, quite glabrous, shining above, subpellucid-punctate, with wavy edges, somewhat aromatic; main lateral nerves up to about 30 on either half, faint, very oblique, base cuneate; petiole 2·5 in. long. *Flowers* yellowish-green, 1·1-2 in. long, in fascicles or very short umbels from axils of fallen leaves; pedicels slender, 1-2 in. long, with 1 or 2 minute bracts about the middle. *Sepals* about 2 in. long, ovate-triangular, densely-pubescent. *Petals* about 1 by 2 in., tapering from a slightly expanded base puberulous. *Ripe carpels* numerous, black, 7-9 by 5-6 in., on glabrous stalks 3-5 in. long; seed smooth, shining.

Cultivated as an ornamental tree in almost all the towns of ASSAM.

Wood whitish, fairly even grained but not strong. Suitable for pack, cages, barrels, etc.

Fls. 3-5 Fr. 7-9.

2. *Polyalthia simiarum*, Benth. & Hk. f. Vern. *Bor-koliori*, Ass. (Makum); *Boga-khamlou*, Ass. (Darr.); *Deing lar-sei*, Deing-ja-roi, Khasi; *Silem-phang*, Senem-phang, Kach.; *Mengchuri-arong*, Phangpit-arong, Mik.; *Jethou*, Kuki; *Jathou*, Tipp.; *Mikar-asing*, Miri; *Khandou*, Mech; *Bolang-banchihok*, Jira, Borsthi, Garo.

A large tree up to 100ft. in height and 8 ft. in girth, practically evergreen, with a simple stem, thin horizontal branched and very thin branchlets. *Bark* light or dark-grey and smooth nearly outside except for horizontal wrinkles and very fine vertical fissures, blaze light-brown or white with often a shade of purple,

in thin lace-like concentric layers, about 1 in. thick. *Leaves* bifarious, 5-10 by 2-4.5 in., oblong, obovate, elliptic or lanceolate, rather abruptly acuminate, thinly coriaceous, glabrous and shining above, sometimes more or less pubescent along the midrib and nerves beneath, pinkish-brown and drooping when young; lateral nerves 12-18 on either half, arcuate, conspicuous beneath, tertiaries transverse to the secondary nerves, parallel, very slender; base rounded, rarely suddenly cuneate; petiole about .2 in. long. *Flowers* yellowish green, 1-1.5 in. long, in fascicles from axils of fallen leaves or from tubercles on the branches; pedicels as long as the flowers, slender, minutely pubescent with a bract about the middle. *Sepals* 1-1.5 in. long, bluntly ovate, recurved, pubescent outside. *Petals* 1-1.25 in. long, strap-shaped or linear-lanceolate, spreading, puberulous outside, equal or the inner somewhat longer. *Ripe carpels* about 40, 1.25-1.5 in. long, obovoid, glabrous, turning orange-red to blue-black in ripening, gradually narrowed to a stalk 1-2 in. long. *Seed* ovoid, grooved and transversely ribbed.

Fairly common throughout UPPER ASSAM but very common in the MIKIR HILLS and forests along the foot of the HIMALAYAS in DARRANG, e.g. Pabhoi, Nanduar, Balipara, etc.

Fresh-cut wood is white outside but yellowish towards the centre. Annual rings indistinct; medullary rays close and equidistant; pores of various sizes and of irregular shape. Weight about 35 lbs. per c. ft. The wood seems to be suitable for tea-boxes and such other purposes. The fibres of the bark are made into ropes.

Figs. 6-11. Fr. 5-8.

3. *Polyalthia Jenkinisii*, Benth. and Hk. f. Vern. *Koliori*, *Tita-hachi* (*sachi*), *Kola-khamton*, Ass.; *Dieng-ther*, Khasi; *Theng-piopsu*, Mik.; *Khem-judi*, *Thaisin-jola*, Kach.; *Jong-mochal*, Jathu, Kuki; *Bol-jakru-ehhen*, Garo.; *Kalikath*, Nep.

A middle-sized evergreen tree with a simple stem often fluted at the base and thin but long horizontal branches; young shoots generally rusty pubescent. *Bark* black or very dark-brown and fairly smooth outside, yellowish or brown inside, .2-.3 in. thick. *Leaves* 4-7 by 1.2-3 in., oblong-lanceolate, elliptic or ovate, acute or acuminate, membranous or chartaceous, dark-green, glabrous except the midrib above which is puberulous, shining above; lateral nerves 7 on either side, slender, arching, forming an intramarginal nerve away from the edge, tertiaries finely reticulating; base generally acute or subacute; petiole .2-.3 in. long, puberulous. *Flowers* axillary, generally solitary, spreading, 2-3 in. diam., scented, white to pale-yellow; pedicels .6-.8 in. long, expanding towards the apex, bracteate at the base. *Sepals* very small, suborbicular, puberulous. *Petals* sub-coriaceous, oblanceolate, narrowed at the base, faintly longitudinally nerved. *Ripe carpels* 30-50, .4-.5 by .25-.3 in., oblong, apiculate, verruculose, on slender stalks as long as the carpels. *Seeds* smooth.

Found in all the Districts specially of UPPER ASSAM. Fairly common in some parts of the SIBSAGAR DISTRICT including the MIKIR HILLS; also in the GARO, KHASI and N. CACHAR HILLS and the SURMA VALLEY.

The wood is used for house-posts and ridge poles. The Kacharis consider poles of this tree indispensable for carrying their dead bodies.

Fls. 8-10, Fr. 12-6.

4. *Polyalthia cerasoides*, Benth. & Hk. f.

A shrub about 10 ft. high with black or pale-grey lenticellate bark; young parts rusty-tomentose. *Leaves* 3-7 by 1-1.5 in., oblong-lanceolate, generally long-acuminate, membranous, glabrous above except the midrib which is puberulous, glabrescent beneath; main lateral nerves 8-10 on either side besides a few intermediate ones, very slender and arched, forming loops away from the edge, indistinct above; base more or less rounded; petiole .1 in. long, stout. *Flowers* axillary, greenish-white, .3-5 in. diam. *Sepals* membranous, ovate-lanceolate, hairy outside, glabrous inside, as long as or slightly shorter than the petals. *Petals* .2-3 in. long, coriaceous, puberulous, incurved. *Ripe carpels* about .4 in. long, ellipsoid or ovoid, on stalks .5-7 in. long.

Nizamghat, N. E. FRONTIER DISTRICT.

Fls. 10-12.

5. *Polyalthia suberosa*, Benth. & Hk. f. Vern. *Makhanisra-phang*, Kach.; *Hahida-cha* (wild tea), Mik.

A large handsome shrub branched almost down to the base branchlets rusty-pubescent; older ones lenticellate; stem dark-brown with reticulately furrowed cork. *Bark* reddish inside, about .1 in. thick. *Leaves* 2-5 by .8-1.6 in., oblong, obtuse, or sub-acute usually thin glabrous and shining above, sparsely pubescent or glabrescent beneath. *Flowers* .3-4 in. across, on slender extra-axillary peduncles .5-1 in. long, which are puberulous and with minute bracts at the base. *Sepals* much smaller than the petals, spreading, pubescent. *Petals* reddish-brown, ovate, silky outside, the outer shorter than the inner. *Ripe carpels* subglobose, .2 in. diam., on stalks .2-3 in. long; seed globose, smooth.

NOWGONG; KHASI HILLS.

Deserves to be planted in gardens on account of its ornamental appearance.

Fls. 4-5, Fr. 10-12.

2. UNONA, Linn.

Trees or shrubs, the latter erect or climbing. *Leaves* generally thin. *Flowers* axillary, leaf-opposed or terminal, often solitary. *Sepals* 3, valvate. *Petals* 6, valvate, in two series (the inner wanting in *U. longiflora*), long or elongated. *Stamens* cuneate; anthers exserted. *Carpels* numerous; styles recurved, grooved. *Ripe carpels* generally elongate and constricted between the seeds. *Seeds* 1-5.

A tree. Leaves upto 5 in. in length; petals strap-shaped, thin.

... 1. *U. præcox*.

Shrubs erect, sarmentose or climbing:—

Flowers red usually on very long axillary peduncles:—

Petals 3 (sometimes 2), 3-5 in. long, very narrow.

fleshy with no constriction between claw and limb.

Leaves up to a foot in length.

... 2. *U. longiflora*.

4. ANONACEÆ.

Unona.

Flowers yellow or yellowish-green on long or short extra-axillary peduncles:—

Petals 6 in 2 series, more or less broad and narrowed above the claw:—

- | | | |
|--|-----|-----------------------|
| Generally sarmentose. Flowering peduncles 2-7 in. long. Leaves up to 9 in. in length. | ... | 3. <i>U. Desmos</i> |
| Erect shrub, often climbing. Flowering peduncles 1-2 in. long. Leaves up to 7 in. in length. | ... | 4. <i>U. discolor</i> |
| Climbing shrub. Flowering peduncles up to 1½ in. in length. Leaves up to 5 in. in length. | ... | 5. <i>U. dumosa</i> . |

1. *Unona præcox*, Hk. f. & Th. Vern. *Porteng-phang*, Kach.

A deciduous tree up to 90 ft. in height and 4 ft. in girth with a narrow conical crown; young shoots puberulous. Bark grey fairly smooth except for warts, shallow vertical fissures and faint horizontal wrinkles; inside light-brown, very fibrous and in thin lace-like plates. Leaves 2-5 by 1-1.8 in., elliptic ovate or lanceolate, finely acuminate, membranous, glabrescent, minutely punctate underneath; main lateral nerves 10-12 on either half, very slender, arcuate, tertiaries exceedingly fine and closely reticulate; base cuneate; petiole 2-3 in. long, slender, channelled. Flowers light-green, 2.5-3.5 in. long, from bases of current year's shoots, pendulous, sweet-scented; peduncles 1 in. long, slender, ebracteate. Sepals 4-7 in. long, linear-oblong, membranous, reflexed. Petals—outer 2.5 by .25, inner 3.2 by 3 in., linear, membranous, glabrous, pale-green. Stamens truncate. Carpels glabrous; styles oblong, pilose.

Banks of the Burisoti in the N. E. FRONTIER DISTRICT also Dhansiri Reserve in NOWGONG DIVISION, and other parts of the MIKIR HILLS,—not very common.

Wood light-grey; medullary rays fairly broad, not very close, annual rings marked by larger and more numerous pores.

Figs. 4-5.

2. *Unona longiflora*, Roxb. Vern. *Jor-lewa*. Ass.; *Dieng-phallam*, Khasi; *Dieng-sa-la-tyrkai*, Synt.; *Theseming*, Mikir; *Meruang-omak*, Garo.

Usually an erect glabrous shrub with a simple stem 10-12 ft. high and slender spreading branches; branchlets minutely verrucose when dry; leaf-buds silky. Leaves 5-12 by 1.7-4 in., narrowly oblong or oblong-lanceolate, acute or acuminate, chartaceous, green and more or less shining above, glaucous beneath; lateral nerves 12-16 on either half, tertiaries sub-parallel and more or less transverse to the secondary nerves, the spaces between them closely reticulate with very slender quarternary nerves; base rounded or subcuneate; petiole 3-5 in. long somewhat swollen, finely channelled, verrucose. Flowers red, horn-shaped in outline, pendulous; peduncles axillary, 1-4 in. long, elongating in fruit, bracteate and jointed near the base, expanded at the upper extremity. Sepals 3, very broadly triangular, acute, pubescent outside. Petals 2 or 3, 3-6 in. long, very gradually tapering from a broad base, red, fleshy, puberulous outside, inner wanting. Connectives of stamens produced but truncate. Carpels few in

flowers with long peduncles, but up to about 60 in short-peduncled-flowers. *Ripe carpels* 7-60 (varying inversely with the length of the peduncle), moniliform, on stalks '6-1 in. long which are channelled above; joints 1-4, '5-'7 by '2-'3 in. elongate-ellipsoid, verrucose.

In ravines of the MIKIR HILLS near Barpathar also Daiang Reserve, SIBSAGAR DIVISION; Kulsi reserve KAMRUP : CACHAR : and KHASI HILLS upto 3500 ft.

Fls. 4-5. Fr. 10-12.

3. *Unona Desmos*, Dunal.

A straggling or climbing shrub : branchlets rufous-pubescent. *Leaves* 4-9 by 1·5-3·5 in., oblong-lanceolate, acute or acuminate thinly coriaceous, glabrous above, puberulous beneath ; lateral nerves 12-14 on either half ; base rounded ; petiole '3-4 in. long. *Flowers* solitary, about 2 in. long, yellow, odorous, pendulous ; peduncles extra-axillary, 2-7 in. long, slender, 2-bracteate. *Sepals* '3-4 in. long, ovate, acuminate, pubescent. *Petals* coriaceous, obovate to ovate-lanceolate, golden-pubescent, longitudinally 3-6 nerved, outer up to 2 by 1 in., inner shorter and narrower. *Ripe carpels* numerous, '5-'7 in. long on stalks of the same length, glabrous, constricted between the 1-6 joints, glossy-green when young.

In evergreen forests between Makum and Lumding

4. *Unona discolor*, Vahl.

A spreading ever-green erect shrub, 6-8 ft. high, often also climbing, with rough grey bark ; young branches slender, more or less pubescent. *Leaves* 2-farious, 3-7 by 1-2 in., oblong, oblong-lanceolate or oblanceolate, acuminate, rounded at the base membranous, glabrous above, pale and more or less pubescent beneath, (in var. *pubescens* densely so) ; lateral nerves 8-12 on either half, very oblique, slender, free at the outer extremity. *Flowers* leaf-opposed or extra-axillary, solitary, about 2 in. long on peduncles 1-1·5 in. long, with a small linear bracteole below the middle, slender in flower, thickening in fruit. *Sepals* '4-'6 in. long, ovate-acuminate, spreading. *Petals* about 2 in. long, narrow-lanceolate coriaceous, glabrous or adpressedly silky. *Anthers* with a spreading top. *Ripe carpels* numerous, '75-1·5 in. long, 2-5-seeded, constricted between the ovoid joints, on stalks '2-2·5 in. long.

UPPER ASSAM, SYLHET and the KHASI HILLS ; fairly common in evergreen forests.

Fls. 4-6. Fr. 9-12.

5. *Unona dumosa*, Roxb.

A large woody climber ; young shoots softly rufous-tomentose. *Leaves* 2-5 by 1·3-2·5 in., ovate-oblong, obovate or lanceolate, subacute, membranous, glabrescent above, softly rufous-tomentose beneath ; lateral nerves 8-12 on either half, straight or slight-

ly arched; base rounded or subcordate; petiole .25-.4 in. long, rusty-tomentose. *Flowers* 2-3 in. long, solitary, yellowish-green, pendulous; peduncles leaf-opposed or terminal, 1-1.5 in. long, slender, tomentose, with a bract below the middle resembling a sepal. *Sepals* .4 in. long, ovate, tomentose, longitudinally nerved. *Petals* elliptic or spatulate, 3-7-nerved, velvety-pubescent; outer 2-3 by .7-1.5 in., inner somewhat smaller. *Ripe carpels* about 20, glabrous, 1-4-seeded, on stalks .5-.7 in. long, much constricted between the ovoid or ellipsoidal seeds.

Daïang to Kalioni in the SIBSAGAR DISTRICT, possibly also in LAKHIMPUR between Jaipur and Margherita.

3. POPOWIA, Endl.

Evergreen erect shrubs or small trees. *Flowers* small, extra-axillary or leaf-opposed, often polygamous, never fully open. *Sepals* 3, ovate, valvate. *Petals* 6, in two series, valvate (inner imbricate in *P. Kurzii*), outer spreading, inner thick, concave, acute. *Anther-cells* dorsal, remote. *Carpels* generally few, ovoid; ovules 1-2, ventral or basal, erect. *Ripe carpels* berry-like.

Leaves wholly glabrous, silvery underneath; tertiary nerves transverse to the secondary. Inner petals valvate

1. *P. Hookeri*

Leaves sparsely adpressed-pubescent on both surfaces, granulate above; petiole tomentose; midrib strigose; tertiary nerves transverse to the midrib. Inner petals imbricate

2. *P. Kurzii*.

1. *Popowia Hookeri*, King. Syn. *Polyalthia argentea*, Hk. f. & Th. Fl. Br. Ind. I. 67.

A wholly glabrous shrub; branches dark-brown or black. *Leaves* 4-7 by 1.2-2.5 in., oblong or oblanceolate, abruptly acuminate, thinly chartaceous, glabrous, dull-silvery beneath; lateral nerves 8-10 on either side, slender, arcuate, tertiaries transverse to the secondary nerves, more or less parallel; base acute; petiole .12-.16 in. long, terete. *Flowers* very small, polygamous, solitary or in fascicles of 2-3 from extra-axillary tubercles. *Ripe carpels* .7-.8 by .3 in., oblong, rugose, faintly transversely ribbed when dry, minutely apiculate, on stalks .2-.35 in. long.

Banks of the Dihou. SIBSAGAR DISTRICT, towards the foot of the NAGA HILLS; also Balipara in DARRANG. Very possibly in similar localities elsewhere.

2. *Popowia Kurzii*, King.

A shrub 6-8 ft. high; young shoots tawny-pubescent. *Leaves* 4-9 by 1.5-3 in., obovate, oblanceolate or elliptic, thinly coriaceous, sparsely adpressed-pubescent on both surfaces, minutely granulate above, pale beneath; lateral nerves 8-12 on either side of the strigose midrib, arcuate, tertiaries faint, transverse to the midrib; petiole .2-.25 in. long, stout, tomentose. *Flowers* extra-axillary, solitary or in pairs, sub-globose, subsessile. *Sepals* smaller than the petals and like them tomentose outside. *Petals* concave, outer valvate, slightly larger than the inner which are imbricate.

Fruit 8 in. by 3 in., rugose; seed with two longitudinal channels, otherwise smooth.

Only found hitherto at Garampani, DISTRICT SIBSAGAR.

Fls. 5-8. Fr. 10-12.

4. GONIOTHALAMUS, Bl.

Small trees or shrubs. *Leaves* generally large, oblong, coriaceous; lateral nerves short, anastomosing to form intramarginal loops. *Flowers* axillary, solitary or fascicled; peduncles with scaly distichous bracts at the base. *Sepals* 3, valvate. *Petals* 6, valvate, in two series; outer thick, flat; inner smaller, shortly clawed, cohering to form a volt over the stamens and carpels. *Stamens* many; anther-cells distant; connective prominent and produced beyond the anthers into variously shaped processes. *Carpels* many; ovules 1 or 2, in the latter case superposed, sub-basal. *Ripe-carpels* 1-seeded.

Leaves glabrous. Ripe carpels sub-sessile. ... 1. *G. sesquipedalis*.

Leaves brown-tomentose along nerves beneath.

Ripe carpels long-stalked. ... 2. *G. Simonsii*.

1. *Goniotalamus sesquipedalis*, Hk. f. & Th. Vern. *Soh-um-synrang*, *Skum-synsar*, Khasi; *Leikham*, Manipur; *Kham*, Lushai.

A sparingly branched undershrub 4-8 ft. high. *Leaves* 10-15 by 2-3.5 in., oblong, bluntly acuminate, narrowed at the base, coriaceous, glabrous, dark-green above, pale and minutely punctate beneath, margins revolute, midrib stout; lateral nerves 15-18 on either half, anastomosing to form large intramarginal loops; petiole about .5 in. long, stout, channelled. *Flowers* greenish-yellow, axillary or supra-axillary, solitary; buds triquetrous. *Sepals* 2-3 in. long, glabrous, green, shining inside. *Outer petals* 1 in. long, glabrous, or slightly pubescent outside, inner .7-.8 in. long, pubescent. *Carpels* usually 5, sometimes more, with golden hairs; styles slightly recurved. *Ripe carpels* solitary or 2-4, .7 by .3 in., slightly tapering, shortly stalked, supported by the persistent calyx, red to cherry-coloured while ripening; seed large.

KHASI HILLS up to 4,000 ft. Also on the Bhuban Hill in CACHAR, 2,400 ft., c. g., Mainadhar, Bhubandhar, etc.

The dry leaves are burnt as an incense in temples in Manipur.

Fls. 5-6. Fr. 11-12.

2. *Goniotalamus Simonsii*, Hk. f. & Th.

A large shrub or small tree; young parts brown-pubescent. *Leaves* 10-15 by 3-5 in., narrowly elliptic or obovate-oblong, caudate-acuminate, rounded or sub-acute at the base, thinly coriaceous, glabrous and glossy above, brown-tomentose chiefly along the midrib and nerves beneath, minutely punctate; lateral nerves 13-20 on either half, almost straight, anastomosing at their extremities to form a continuous wavy intramarginal nerve; reticulations strong but rather open; petiole .4-.6 in. long, channelled, tomentose. *Flowers* axillary, solitary, 1-1.5 in. long.

peduncles 2-3 in. long, supported by a pair of bracts. *Sepals* 5 in. long, ovate or triangular, persistent. *Outer petals* 1.5-2 in. long, cream-coloured, oblong-lanceolate, pubescent; inner 5 in. long, forming a triquetrous cone, pubescent; style cylindrical. *Ripe carpels* 5 in. long, oblong, mucronate; torus elongated.

KHASI HILLS, 2-3,000 ft., chiefly along shady streams, e. g., Umran, Nongpoh, etc.

Fls. 5-6. Fr. 8-9.

5. MITREPHORA, Bl.

Mitrephora tomentosa, Hk. f. & Th. Vern. *Kolh, Koliori*, Ass.; *Jeithuh-ang-thing*, Kuki. *Thingpi-ikso-arong*, *Golthi-arong*, Mik.; *Sinam-jola*, Kach.

Usually a small evergreen tree, but individual trees have been seen up to 70 ft. in height and 5 ft. in girth. *Bark* smoothish excepting for very shallow and distant vertical fissures, dark-brown or very nearly black outside, generally with large white blotches; blaze very light dun-brown with distant broad strands of white and softer granular tissues, otherwise finely fibrous and in thin concentric layers. *Leaves* 3-7 by 1-3 in., varying in shape from ovate to narrow-lanceolate even on the same twig, acute or acuminate, subcoriaceous, dark-green, glabrous and shining above (except the pubescent midrib); undersurface velvety rusty-tomentose on young trees, glabrescent and pubescent along the nerves on older individuals; lateral nerves 10-15 on either half, slender, very oblique but only slightly arched, tertiary invisible; base rounded; petiole 2-3 in. long, stout, tomentose. *Flowers* 2-3 in. across, in short leaf-opposed cymes, each supported by a large broad bract. *Sepals* 3, 2-3 in. long and as broad, acute, densely rusty-tomentose. *Outer petals* 1-1.5 by .7 in., yellow with faint purple veins outside, inner 5-7 by .5 in. clawed, closely purple-veined and velvety outside, white-hairy and ribbed inside, cohering by margins to form a vault over the anthers and stigmas. *Ripe carpels* 1 in. long, sub-globose, densely rusty-tomentose; seeds 2, plano-convex.

GARO HILLS, NOWGONG, N. CACHAR HILLS, KAMRUP, etc.

Wood even-grained, compact, dun-white, in regular thin concentric bands; medullary rays very fine, regular, about 125 to the inch; weight about 50 lbs. per c. ft. It is liable to split, but is used for posts and such other purposes in NOWGONG.

Fls. 3-5. Fr. 8-10.

6. ALPHONSEA, Hk. f. & Th.

Tall evergreen trees with tough fibrous bark. *Leaves* coriaceous, glabrous and shining above. *Flowers* generally in leaf-opposed fascicles; buds conical; pedicels bracteolate. *Sepals* 3, small, valvate. *Petals* 6, in 2 series, valvate, much larger than the sepals, of the inner whorl usually slightly smaller. *Stamens* indefinite; anther-cells dorsal; connective apiculate. *Carpels*

1-12; ovules 4-10 in 2 series. *Ripe carpels* 4-6, sessile or stalked, ovoid or oblong-ovoid.

Leaves 6-10 in. long, narrow-oblong. Sepals free.

Carpels long-stalked.

Leaves 3-6 in. long, ovate-oblong. Sepals connate.

Carpels very shortly stalked.

1. *A. ventricosa*.

2. *A. lutea*.

1. *Alphonsea ventricosa*, Hk. f. & Th. Vern. *Noga-kola*, Ass., *Norlok-arong*, *Jhingpu-arung-otirang*, Mik. (near Bar-pathar); *Thaisen-phang*, *Rulany-buphang*, Kach.; *Thet-look-ek*, *Jong-mot*, Kuki; *Pakna-kala*. Cach.

A tall tree with a short conical crown, attaining 100 ft. in height and 7 ft. in girth; branches at first softly tomentose but become speedily glabrous and blackish. *Leaves* 6-10 by 1.5-2.8 in., oblong to oblong-elliptic, shortly acuminate; cuneate or rounded at the base, coriaceous, glabrous except for a little pubescence on the midrib beneath when young, shining above, turning yellow before falling; lateral nerves slender, irregular, 12-18 on either half, reticulations fine and open; petiole 1-2.5 in. long, stout, pubescent. *Flowers* greenish-white, 3-4 in. long, in short leaf-opposed extra-axillary racemes; pedicels 4-5 in. long, rusty-tomentose, with a bracteole at the base and another about the middle. *Sepals* very small, broadly ovate or deltoid, acute, tomentose outside. *Petals* 4-5 in. long, sub-equal, oblong, acute, sub-cordate and more or less saccate at the base, pubescent on both surfaces. *Stamens* broad, pointed. *Carpels* oblong, tapering to the apex, densely pubescent; ovules many. *Ripe-carpels* 1.5-2.5 by 1.2-1.8 in. diam., ovoid, minutely pubescent, yellowish when ripe, up to 4-5 from a single flower; stalk 4-5 in. long. *Seeds* compressed, in two rows, immersed in an aromatic yellowish pulp; testa horny, brown.

Along the foot of the NAGA HILLS in LAKHIMPUR and SIBSAGAR; CACHAR including the NORTH CACHAR HILLS; Singa Reserve in SYLHET; NOWGONG; Khaling-duar in DARRANG; GOALPARA—Guma res.; and KHASI HILLS—Raikhwang; probably all over the province.

Wood greenish brown, even-grained. Medullary rays of varying thickness, rather broader than in most other Anonaceous trees, tangential bars very close; pores large, often sub-divided. It is very elastic and is used for posts, poles, etc. Weight about 40 lbs. per c. ft. The aromatic pulp of the ripe fruit is eaten.

Figs. 3-4. Fr. 7-9.

2. *Alphonsea lutea*, Hk. f. & Th. Vern. *Jong-mot-kung*. Tipp. The Vernacular names of *A. ventricosa* are also loosely applied to this species.

Apparently a somewhat smaller tree than the foregoing species; young parts minutely rufous-tomentose. *Leaves* 2.5-6 by 1.2-2.3 in., ovate-oblong to elliptic, obtusely acuminate, sub-cuneate or rounded at the base, coriaceous, glabrous and shining above, sparsely strigose beneath; lateral nerves 8-10 on either half, faint and irregular. *Racemes* very short, leaf-opposed, subsessile, each with 2 or 3 flowers and many small bracts. *Flowers*, 6-7 in. diam.; pedicels tomentose, with only one bracteole rather

above the middle. *Sepals* connate into a 3-cornered shallow cup, tomentose outside, glabrous inside. *Stamens* short, broad, flat in three rows. *Carpels* oblong, compressed, strigose; style very short glabrous. *Ripe carpels* 2-4, open solitary, 1.3-1.5 by .8-1.2 in., broadly ovoid, pointed, puberulous; stalk .2-.4 in. long, very stout. *Seeds* 3-6, in two rows, oval-oblong, pointed.

Occurs along the south-eastern boundary of the PROVINCE chiefly in CACHAR and SYLHET, and is very liable to be mistaken for young individuals of the other species.

Economic uses and flowering and fruiting time are Probably the same as of *A. ventricosa*.

7. CYATHOCALYX, Champion.

Cyathocalyx martabanicus, Hk. f. & Th. Vern. *Bolong*, Garo; *Hrieroth*, Lushai.

A tall and graceful evergreen tree with a narrow crown attaining about 140 ft. in height and 6 ft. in girth. *Bark* .3-.5 in. thick, grey and fairly plain but with a few horizontal wrinkles outside, dun-brown and faintly mottled inside, innermost layers in fibrous plates. *Leaves* sub-bifarious, 4-9 by 1.2-3 in. elliptic or elliptic-oblong, bluntly acuminate, cuneate or sometimes rounded at the base, coriaceous, glabrous, dark-green and shining above, somewhat pale beneath, turning yellow before falling; lateral nerves 8-12 on either half, very oblique, arching, slightly impressed above; reticulations very fine but distinct; petiole .3-.5 in. long, margined. *Flowers* extra-axillary, sometimes opposite the axils, usually solitary, .8-1.5 in. long, densely buff-pubescent throughout, pedicels .3-.5 in. long. *Calyx* as long as the pedicel, deeply divided; lobes oblong-lanceolate, reflexed. *Petals* in two whorls of three each, .7-1.2 in. long, oblong-lanceolate, spreading, somewhat fleshy, of the inner whorl slightly smaller. *Stamens* numerous truncate; anthers extrorse. *Mature carpel* solitary, 2.5-3 by 2-2.5 in., oblong, transversely depressed between the seeds, greenish-white, turning to cherry-colour when fully ripe. *Seeds* 6-10, transversely set in two rows, 1-1.2 by .7-.9 in., oblong, flat, with a blunt ridge right round, brown shining; albumen mottled.

LUSHAI, NORTH CACHAR and the GARO HILLS, up to 3,000 ft. Rather rare.

The timber, though soft appears to be very elastic. The sweetish-aromatic pulp of the ripe fruit is eaten.

Fls. 4-5. Fr. 10-11.

8. MILIUSA, Lesch.

Trees or shrubs. *Flowers* usually 2-sexual, rarely polygamous, green or red, axillary or extra-axillary, solitary fascicled or cymose. *Sepals* 3, small, valvate. *Petals* 6 in 2 series, valvate outer small like the sepals, inner larger but thinner, at first cohering by their margins, ultimately free. *Stamens* definite or indefinite; anthers extrorse; connective slightly apiculate. *Carpels*

indefinite ; style usually very short. *Ripe carpels* globose, 1-2- or many-seeded.

Leaves velvety-tomentose on both surfaces, apiculate ;—

Flowers 2-sexual, *Ripe carpels* puberulous, 2-seeded. ... 1. *M. velutina*.

Leaves glabrous and shining above, acuminate.

Ripe carpels, 1-seeded ;—

Flowers 2-sexual. Leaves up to 7 in. in length, sub-

coriaceous.

... 2. *M. macrocarpa*.

Flowers polygamous. Leaves up to 5 in. in length.

membranous.

... 3. *M. Roxburghiana*.

1. *Miliusa velutina*, Hk. f. and Th. Vern. *Bor-Samphol*, Garo.

Rather a small-sized deciduous tree usually not exceeding 40ft. in height ; young branches and all other parts grey-tomentose. *Bark* dark-greyish-brown, rough, inside dun-brown, soft, 7-1 in. thick, fibrous. *Leaves* very variable in size and shape, 4-10 by 2.5-6 in., ovate-elliptic oblong or obovate, acute or shortly acuminate, more or less cordate at the base, sub-coriaceous, aromatic, thinly velvety-tomentose above, more densely beneath, turning yellow before falling ; lateral nerves 12-16 on either half, slender, slightly arched ; petiole 1-2 in. long. *Flowers* pale-yellow, about 4 in. diam., on 2-4 in. long slender ebracteolate pedicels, which arise singly or 2-3 together from short leaf-opposed peduncles. *Sepals* and *outer petals* similar, 1-in. long ovate, valvate in bud ; inner petals 2-3 in. long, broadly ovate, dark-brown, densely tomentose outside, glabrous inside. *Stamens* short ; filaments stout shortly apiculate ; anthers distinct and distant. *Carpels* 2-ovuled ; stigma sessile. *Ripe carpels* 5-7.5 in. in diam., ovoid or oblong, bluish-purple, on stalks 25-35 in. long. *Seeds* 2 on a parietal placenta.

Foot of the GARO HILLS in Sal-bearing tracts e. g. near Fulbari ; also on the Tokrabhandha and Chandordinga Hills of the North bank of the Brahmaputra in GOALPARA. Rare except in the above localities.

Wood weighs about 40 lbs per c. ft. and is moderately hard and durable, but being liable to warp is seldom used as timber.

Fls. 2-5, Fr. 8-10.

2. *Miliusa macrocarpa*, Hk. f. and Th.

A small tree ; branchlets thin dark-brown, lenticellate when old. *Leaves* 2-7 by 1-2.4 in., bifarious, oblong, oblong-lanceolate or oblanceolate, caudate-acuminate, more or less acute at the base, membranous or chartaceous, dull and glabrous above except the midrib which is puberulous or muricate, pale but perfectly glabrous and shining underneath ; main lateral nerves about 8 on either half, arcuate, slender but conspicuous, anastomosing to form a looped intramarginal nerve ; petiole 12-2 in. long, stout, channelled. *Flowers* 7 in. across, extra-axillary or leaf-opposed, solitary or in few-flowered cymes on pedicels 1.25-2 in. long, which expand towards the upper extremity ; buds globose or ovoid. *Sepals* and *outer petals* alike, ovate, acuminate, reflexed, glabrous and granulate outside, dull rusty-pubescent within. *Inner petals* obovate, 5-6 in. long, erect, reddish-brown with red veins, glabrous except for a few rugacious hairs near the margins

and extremities on the inner surface. *Stamens* numerous intermixed with hairs; anthers linear. *Carpels* numerous, pubescent, stalked, 1-2-ovuled. *Ripe carpels* .6-.8 by .3-.4 in., oblong or obovoid, terete, generally 1-seeded; pericarp pulpy.

KHASI HILLS e.g., Wah Mawkhap, and similar other localities 3-5,000 ft. Fls. 3-5.

3. *Miliusa Roxburghiana*, Hk. f. and Th. Vern. *Bon-ponial*, (Makum); *Chhag-loti*, *Chhag-ladoi*, Ass. (N. Lakh); *Jora-bhanora*, Ass. (Darrang), *Dieng-khong*, Khasi, *Dieng-jwat*, Synt. *Tase-mayang-changne*, Daff.

A small deciduous tree scarcely more than 20 ft. in height with spreading branches and pubescent young shoots. *Bark* grey, fairly smooth but often with vertical rows of lenticels, inside dark-brown, turning deeper brown after exposure. *Leaves* 2-farious, somewhat aromatic 2-5 by .8-2 in., elliptic, oblong or lanceolate, acuminate, thinly coriaceous, upper surface glabrous except the puberulous midrib, lower at first pubescent, glabrescent with age; main lateral nerves about 10 on either side of midrib, arched and looped to form an intramarginal nerve away from the edge, tertiary veins inconspicuous; base more or less rounded; petiole about .1 in. long, pubescent. *Flowers* dioecious or polygamous about .5 in. long, axillary, solitary or 2-3 together on pedicels .5-1.5 in. long. *Sepals* and *outer petals* alike, small, lanceolate, reflexed, tomentose outside; *inner petals* red, .5-.6 in. long, ovate, subacute, more or less saccate at the base. *Ripe carpels* oblong or subglobose, .3-.35 in. long, glabrous, verrucose, on slender stalks .4-.8 in. long, generally 1-seeded.

Occurs in most DISTRICTS ascending to 4000 ft. in KHASI HILLS.

Wood greyish-white, hard; tangential bars close, numerous, wavy; medullary rays of various thickness, very numerous; pores very scanty; weight about 50 lbs. per c. ft. The wood is fit to be used for agricultural implements and such other purposes. The bruised leaves are used by the Daffias as smelling salt when they get headache.

Figs. 3-4. Fr. 11-12.

9. SAGERÆA, Dalz.

Sageræa laurina, Dalz. Syn. *Bocagea Dalzellii*, Hk. f. and Th.

A middle-sized tree up to 60 ft. in height and over 3 ft. in girth with a conical crown and thin glabrous branchlets. *Bark* grey and fairly plain outside with very faint vertical fissures .25-.5 in. apart, inside dull-white, consisting of alternate broad bands of fibrous tissue and similar bands of granular tissue. *Leaves* binarious, 3-5 by 1-1.4 in., elliptic or oblanceolate, often somewhat unequal-sided, bluntly caudate-acuminate, abruptly cuncate at the base, chartaceous, glabrous and shining above, with minute translucent dots, and resinous mango-like smell when bruised, turning yellow before falling, midrib prominent beneath, puberulous; lateral nerves about 10-12 on either half, faint and irregular; petiole .2-.25 in. long flattened above, sub-verrucose beneath. *Flowers* dull-yellow, sweet-scented, .25-.3 in., in diam.,

from axile of previous year's leaves, solitary or in fascicles of 2-10, on sessile or stalked tubercles; pedicel 15-5 in. long with scaly bristles at the base. *Sepals* about 15 in. long, ovate, concave. *Petals* of both whorls similar in every respect, 5 by 16 in., thin in texture, more or less spreading. *Anthers* indefinite, dorsal. *Carpels* about 12; ovules about 12 in two rows; style short, lateral. *Ripe carpels* 4-10, shortly stalked, about 1 in. long, 1-seeded.

Only found so far on the Sanitarium Hill near Tura, GARO HILLS.

Wood of a slaty-grey colour even-grained, hard, weighing about 47 lb per c. ft; medullary rays moderately broad, very regular; appears to be suitable for cabinet work.

Fls. & Fr. 2-4.

10. ANONA, Linn.

Shrubs or small trees. *Leaves* pellucid-punctate. *Flowers* terminal or leaf-opposed solitary or in fascicles of 2-3, drooping, yellowish-green. *Sepals* 3, small, valvate. *Petals* 3 or 6; of the outer whorl fleshy and 3-quetrous above with a thinner concave base; of the inner whorl, if present, very small, strap-shaped. *Carpels* partly free in flower, afterwards confluent into a large syncarpous fleshy fruit, 1-ovuled, 1-seeded. *Seed* with fleshy albumen.

Leaves 1.5-5 in. long, dark-green. Fruit greenish-white, deeply areolate and tubercled.

Leaves 5-8 in. long, light-green. Fruit reddish-brown, faintly areolate, not tubercled.

1. *A. squamosa*.

2. *A. reticulata*.

1. *Anona squamosa*, Linn. Vern. *Ata*, Beng.; *Ata-Kothal*. Ass.; *Sitaphal*, Hind. The Custard Apple.

Small tree with a somewhat bushy habit: branches thin, glabrous. *Leaves* 1.5-5 by 1-2 in., oblong or oblong-lanceolate, obovate, obtuse or rounded at the extremity, acute at the base, membranous, glabrate, aromatic; lateral nerves about 8 on either half, slender, oblique; petiole 3-5 in. long. *Flowers* about 1 in. long, pubescent. *Fruit* 2-3 in. in diam., globose deeply white-areolate when ripe; pulp white, sweet, aromatic; seeds 4-5 in. long, oblong-lanceolate in outline, testa horny glossy-black.

Cultivated in LOWER ASSAM and SURMA VALLEY for the fruit.

The roots, bark, leaves and seeds have valuable medicinal properties.

Fls. 3-5. Fr. 8-11.

2. *Anona reticulata*, Linn. Vern. *Nona*, Beng. *Ramphal*, Hind.

A larger tree with longer branches and more open crown than the foregoing; branches thin dark-brown or black, glabrous; fibres reticulate. *Leaves* 5-8 by 1.5-2.5 in., lanceolate or oblong-lanceolate, acuminate, subcoriaceous glabrous, dark-green. *Flowers* 2-3 together. 1-1.3 in. long; inner whorl of petals usually present. *Fruit* 3-4 in. diam. ovoid in outline reddish-brown when

ripe, smooth, faintly areolate, pulp pale, not so sweet or tasty as of the other species; seeds similar.

Sometimes cultivated, but often runs wild in the same localities as the other species. The wood of neither species has any timber value.

Fls. 7-8. Fr. 11-3.

11. UVARIA, Linn.

Scandent or straggling shrubs usually stellately pubescent, *Flowers* 2-sexual, terminal or leaf-opposed, solitary or in fascicles of 2-4, or cymose, yellow, purple or brick-red. *Sepals* 3, valvate, often connate below. *Petals* 6, large, orbicular, oval or oblong in two rows, imbricate, often connate at the base. *Stamens* indefinite; connective concealing the anthers. *Torus* depressed. pubescent or tomentose. *Carpels* indefinite, linear-oblong; style short; ovules usually many in two series. *Ripe carpels* many. ovoid or oblong, stalked, dry or baccate, few or many-seeded.

1. Outer stamens sub-foliaceous :—

A. Leaves variously hairy. Ripe carpels tomentose :—

Peduncles extra-axillary, 1 flowered.

Flowers brick-red, 2 in. in diam.

1. *U. Hamiltoni*.

B. Leaves glabrous or nearly so. Ripe carpels

glabrous :

Peduncles leaf-opposed. Flowers pale yellow, 3 in. diam.

2. *U. bracteata*.

Peduncles extra-axillary or terminal.

Flowers purple, 1.5 in. in diam.

3. *U. macrophylla*.

II. Stamens all cuncate :

Leaves glabrous. Peduncle leaf-opposed or

terminal. Flowers brick red, 2 in. in diam.

Ripe carpels glabrous.

4. *U. lurida*.

1. *Uvaria Hamiltoni*, Hk. f. & Th.

A large woody climber : branchlets rusty-tomentose, often circinate. *Leaves*, 4-8 by 1.8-1 in., elliptic-oblong or obovate, acuminate, rounded or slightly cordate at the base, membranous, adpressed-pubescent, ultimately glabrescent above, softly stellate-pubescent beneath; lateral nerves 11-20 on either half, prominent beneath; petiole 1.5-2 in. long. *Flowers* about 2 in. in diam., extra-axillary, solitary or 2-3 together; peduncles 1.5-1.8 in. long; bract basal, suborbicular. *Sepals* broadly triangular, mucronate, membranous. *Petals* about 1 in. long, red, obovate, coriaceous, minutely tomentose, incurved. *Anthers* about 2 in. long, subsessile. *Carpels* compressed, pubescent. *Ripe carpels* red, about 1.5 in. long, obovoid, tomentose; stalks slender, 1-1.5 in. long, tomentose.

Var. *Kurii*, King which differs from the type by having leaves with semi-cordate broader base and fewer nerves, somewhat smaller and yellowish flowers and shorter pedicels, has been found in the Guma Reserve in GOALAPARA and probably occurs in similar localities in other DISTRICTS.

The type occurs in all DISTRICTS in the BRAHMAPUTRA VALLEY and possibly also the SURMA VALLEY.

Fls. 6-7. Fr. 9-12.

2. *Uvaria bracteata*, Roxb.

A large woody climber; young branchlets rusty-tomentose otherwise dark-brown. *Leaves* 3·5-7 by 1·25-2·5 in. oblong, oblong-lanceolate or oblanceolate, acute or shortly acuminate, tapering towards the rounded or subcordate base, chartaceous, thinly pubescent when very young chiefly along the midrib and nerves, afterwards glabrescent; lateral nerves about 11-13 on either side of the midrib, slender, oblique, slightly arched; petiole 1·5-3 in. long, glabrescent, shining. *Peduncles* extra-axillary, very short, generally 2 flowered; pedicels 3-7 in. long, rusty-tomentose; bracts 2 or 3, rather unequal, leafy. *Flowers* pale-yellow, 6-7 in. in diam. *Sepals* about 1·5 in. long, suborbicular or broadly ovate, connate at the base, pubescent, recurved when the flower is fully open. *Petals* green at first, fading to pale-yellow, 3-4 in. long, broadly ovate, fleshy but with thin margins, concave, shining. *Anthers* sub-sessile, oblong. *Carpels* 10-18, linear, pubescent. *Ripe Carpels* about 2 by 1·3 in., oblong, rounded at both ends, yellow when ripe, glabrous; seeds discoid.

SYLHET and GOALPARA, chiefly in shady ravines.

Fls. 5-6. Fr. 8-10.

3. *Uvaria macrophylla*, Roxb.

A stout woody climber; young parts and petioles rusty-tomentose. *Leaves* 5-10 by 2·5-4 in., elliptic-oblong or ovate, abruptly acuminate, coriaceous, glabrous or glabrescent above except the tomentose midrib and main nerves, rusty stellate-tomentose below; lateral nerves 11-18 on either half, very prominent; base rounded or slightly cordate; petiole 2-3 in. long. *Flowers* purple, 1·5 in. diam. on few-flowered extra-axillary or terminal bracteate peduncles. *Sepals* connate in to a 3-toothed cup about 3 in. in diam. *Petals* 5-6 in. long, purple fleshy, tomentose outside, pubescent inside. *Anthers* sessile. *Ripe carpels* 7-1·5 in. long, oblong, glabrous, on stalks 5-1 in. long from a woody hemispherical torus 1 in. in diam. often with one or two shallow transverse depressions. *Seeds* numerous oval, compressed, shining.

Holongapar Reserve, SIBSAGAR DISTRICT, and possibly elsewhere in similar localities.

The ripe carpels are eaten.

Fls. 5-6. Fr. 9-11.

4. *Uvaria lurida*, Ilk. f. & Th.

A large woody climber; young parts with rusty-stellate scales. *Leaves* 4-7·5 by 1·25-2·4 in., oblong, oblong-lanceolate or oblanceolate, acute or shortly acuminate, rounded or subcuneate at the base, coriaceous, adult glabrous, dark-green and shining above, dull-green underneath; main lateral nerves 8 to 10 on either half with often a few shorter ones between; petiole 1·5-2·5 in. long incurved, verrucose. *Peduncles* terminal or leaf-opposed, 1-2 flowered, about 1 in. long, elongating in fruit, ebracteolate rough with scales; buds globose (club-shaped with the peduncle). *Flowers* 1·5-2·25 in. across. *Sepals* 3, connate at the base, verrucose

outside, pubescent inside. *Petals* 6, uniform, in 2 series and imbricate until fully open, afterwards apparently in a single whorl with valvate margins, broadly ovate, with inflexed tips; brick-red, densely scaly-pubescent outside, minutely pubescent within. *Anthems* about .15 in. long, cuneate with truncate tips. *Carpels* numerous, stalked. *Ripe carpels* 1.2-1.7 by .6-.7 in. cylindrical but narrowed and strongly 3-quetrous at the base, 3-6 seeded; stalks 4-6 in. long. *Seeds* in a single row compressed or globose.

Northern slopes of the KHASI HILLS. up to 2,500 ft., e. g., near Um-Ran.

Fls. 3-5. Fr. 8-11.

12. ARTABOTRYS, R. Br.

Artabotrys caudatus, Wall. Vern. *Dhupa-lota*, Ass.

A large woody climber; young shoots pubescent. *Leaves* 3-5 by 1.2-2.2 in. oblong or elliptic, abruptly bluntly-acuminate, margins often slightly recurved, subcoriaceous, glabrous; lateral nerves 8-12 on either half arched and looped to form intermarginal veins, tertiaries laxly reticulate; base cuneate; petiole .2-.3 in. long. *Flowers* .6-.8 in. long, brown-silky 2-6 from the extremities of recurved and laterally-compressed peduncles. *Sepals* about .15 in. long, broadly triangular-ovate, pubescent. *Petals* .6-.8 in. long, narrowed to the apex, rusty-silky. *Ripe carpels* .4-5, 2 in. long, elliptic, dark-purple. *Seeds* 2, 1 by .6 by .25 in., brown, compressed, rugose, with shallow grooves along the faces and

Garampani SIBSAGAR DISTRICT: Makum Range, LAKHIMRUR DISTRICT. and possibly in all evergreen forests between those two localities.

Fls. 3-5. Fr. 10-12.

13. OXYMITRA, Bl.

Oxymitra fornicata, Hk. f. & Th. Vern. *Mota-bokol-bih*, Ass; *Dumakhal*, Garo; *Rampun-kung*, *Hruirang-monlai*, Tipp.

A woody climber, somewhat gregarious in habit; young shoots brown silky-pubescent, stem dark-brown. *Leaves* 4-7 by 1.3-2.5 in., obovate, oblong or oblanceolate, membranous, glabrescent above, softly pubescent especially along the midrib and nerves beneath; lateral nerves 14-18 on either half, nearly straight, tertiaries transverse to the secondaries, more or less straight and parallel; base subacute or abruptly rounded, sometimes slightly cordate; petiole .2-.3 in. long, densely rusty-tomentose. *Flowers* large, 6-7 in. across when fully-developed, green to pale-yellow, solitary and leaf-opposed or 2-3 on short leafless shoots; peduncles .5-.8 in. long, rusty-pubescent, bracteate at the middle, or sometimes only a little above the base. *Sepals* .6 by .2 in. ovate, acuminate, membranous, pubescent, deciduous. *Petals* membranous, pubescent, outer 2-4 by 1-1.7 in., flat, 5-7 nerved, inner much varying in size from .3 by .2 to 3.2 by 1 in.,

—conniving by a flexure at the base over the carpels and stamens. *Ripe carpels* about 10, subsessile, '6-1 by '2-3 in., cylindrical, verrucose, coppery-puberulous.

There appear to be two varieties of this plant.—1. *Leaves* elongate, sub-acute at base, sparsely pubescent underneath when mature; *inner petals* small.—2. *Leaves* ovate or obovate, with a rounded or subcordate base, more densely pubescent underneath; *inner petals* only slightly smaller than outer.

The commonest Anonaceous plant in all evergreen forests of ASSAM.
Fls. 4-6. Fr. 10-12.

14. MELODORUM, Dunal.

Climbing shrubs. *Flowers* terminal, axillary or leaf-opposed solitary or fascicled; buds triquetrous. *Sepals* 3, small, valvate connate below. *Petals* 6, valvate in two series; of the inner series, triquetrous above, hollowed and concave below. *Stamens* numerous; anther cells contiguous, dorsal. *Carpels* many, free style oblong; ovules 2 or more. *Ripe carpels* berried.

- I. Leaves usually densely pubescent on both surface :—

A. Flowers solitary or fascicled :—

Stalk of ripe carpels 4-8 in. long.

Stalk of ripe carpels '2-3 in. long.

B. Flowers solitary and axillary or in false terminal panicles of 4-6 flowers :—

Stalk of ripe carpels 1-1'6 in. long.

- II. Leaves wholly glabrous at least above :—

Flowers solitary or in fascicles of 2-3, stalk

of ripe carpels 1 in. long.

Flowers cymose, about '25 in. long,

Flowers cymose, minute.

1. *M. verrucosum*.

2. *M. bicolor*

3. *M. rubiginosum*.

4. *M. Wallichii*.

5. *M. polyanthum*.

6. *M. rufinerve*.

1. *Melodorum verrucosum*, Hk. & Th. Vern *Jyrmisoh-ram-khlaw*, Khasi.

A large woody climber; young shoots rusty-tomentose; stem lenticelled. *Leaves* 4-6 by 1'2-2 in., oblong or oblong-lanceolate, acute or acuminate, thinly coriaceous, glabrous above except on the puberulous midrib, softly rusty-tomentose beneath, pinkish-brown when very young; lateral nerves 15-18 on either half, very oblique, almost straight, open with a few very short intermediate nerves, tertiaries very fine, about '05 in. apart, sub-parallel; base rounded or sub-acute; petiole '3-4 in. long, rusty tomentose. *Flowers* solitary, generally leaf-opposed, pale-yellow, delightfully scented, '5 in. long, on bracteate peduncles '6-1 in. long. *Sepals* '2 in. long, broadly ovate spreading, tomentose outside. *Petals* minutely tomentose or puberulous outside. *Carpels* strongly tubercled, rusty pubescent, young club-shaped, ripe globose, 1'5-2 in. in diam., often with a sharp ventral ridge; stalk '1-6 in. long, stout, expanding upward. *Seeds* in two rows closely packed ridges along the edge; pulp aromatic, edible.

MIKIR HILLS and the Nambor Res. SIBSAGAR DISTRICT; Dirju, NORTH LAKHIMPUR; Nongstion, Raliang, Shongdain, etc. about the foot of KHASI HILLS; possibly in all ever-green forests of Assam especially near hills. The ripe berries are eaten with much relish.

Fls. 3-5. Fr. 10-1.

2. *Melodorum bicolor*, Hk. f. & Th. Vern. *Hed-bheduli*, Ass. (Sibs.) ; *Moja-kotta* Waff. ; *Rhuibom* Kuki.

A large woody climber ; stem black ; bark fibrous, brown inside, turning deeper-brown on exposure ; young shoots rufous-hairy. *Leaves* 3-7 by 1·3-3 in., oblong or elliptic-oblong, generally rounded at both ends, thinly coriaceous, glabrous above except on the midrib ; pilosely adpressed hairy underneath, the hairs sometimes varying in colour from light-grey to dark purplish-brown ; main lateral nerves 16-20 on either side of the midrib ; often with shorter intermediate ones between, slightly arched, not looped, tertiaries sub-transverse and sub-parallel ; petiole 2·5 in. long, swollen, slightly channelled, densely rufous-tomentose. *Flowers* generally leaf-opposed, 7·9 in. long, on peduncles 2·3 in. long which are bracteate at the base. *Sepals* ovate, spreading, rufous or grey pubescent outside ; glabrous inside. *Petals* leathery ; outer 6-8 in. long, ovate, yellowish, densely rufous or tan-silky outside, glabrous inside ; inner smaller, deep-red, glabrous. *Carpels* densely tan-silky. *Ripe carpels* about 1 in. diam., globose, mucronate, pubescent, on stalks 25-35 in. long ; torus spherical ; seeds 4-8 oblong.

Fairly common in ever-green forests in LAKHIMPUR, SIBSAGAR and DURRANG, also in the SURMA VALLEY.

Fls. 3-4. Fr. 8-10 (?)

3. *Melodorum rubiginosum*, Hk. f. & Th. Vern. *Thir Kalwang* (*Gahwang*) Garo.

A large woody climber ; young parts rusty-tomentose. *Leaves* 3-10 by 1-4·5 in. oblong or elliptic, acute or abruptly cuneate or rounded at the base, coriaceous, pubescent or tomentose along the stout midrib and nerves otherwise glabrous above, densely rusty-velvety beneath ; lateral nerves 12-14 on either side of the midrib very prominent, oblique, only curving at the outer extremity otherwise straight ; tertiary nerves, transverse to the secondary, parallel ; petiole stout, 4-5·5 in. long, densely rusty tomentose. *Flowers* axillary, solitary or in pairs, sometimes in false terminal panicles of 4-6 flowers due to the fall of the upper leaves, delightfully scented ; pedicels 8-12 in. long with 1 or 2 small ovate bracteoles. *Sepals* 1 in. long broadly ovate, acute, spreading. *Petals* with a broad concave base, outer 1-1·2 in. long, oblong, acuminate, inner more fleshy, smaller and narrower with a thick triquetrous limb. *Stamens* numerous ; anthers linear ; connective with a thin spatulate apical process. *Carpels* 8-10 densely silky ; style short ; ovules many, in 2 rows. *Ripe carpels* 1-1·2 in. long, obliquely ovoid, tomentose ; stalks 1-1·5 in. long.

Chandkhira in SYLHET : Rongrengiri, GARO HILLS : and possibly in all other similar intermediate localities between those two points.

Fls. 11-1.

4. *Melodorum Wallichii*, Hk. f. & Th.

A large woody climber ; branchlets often cirrhiform ; young parts slightly yellow-pubescent. *Leaves* 3-5·5 by 1-1·5 in.,

oblong-lanceolate, acuminate, slightly rounded or sub-cuneate at the base, thinly coriaceous, glabrous and green above, sparsely adpressed-pubescent and pale beneath; lateral nerves 10-12 on either half, oblique, slightly arched; petiole 2-25 in. long, terete, slightly channelled. *Flowers* about 7 in. long, generally leaf-opposed, solitary or in fascicles of 2-3, with 1-3 bracteoles at the base; pedicels 15-3 in. long, elongating in fruit. *Sepals* 25 in. long, ovate, connate at the base, puberulous. *Petals* fleshy, outer 65 in. long, oblong-lanceolate, densely rufous-velvety outside, glabrous inside, inner shorter. *Stamens* numerous; filaments short; anthers linear with short, conical connectives. *Carpels* oblong, oblique. *Ripe carpels* about 1 in. long and 75 in. diam., ovoid, mucronate; stalks 1-14 in. long.

CACHAR. *e. g.*, Phuleria; UPPER ASSAM and the KHASI HILLS.
Fls. 11-12.

5. *Melodorum polyanthum*, Hk. f. & Th. Vern. *Karle-phingnu*, Mik.

A large woody climber; young shoots very minutely puberulous or glabrous; stem dark coloured. *Leaves* 3.5-7 by 1.5-2.4 in., oblong, elliptic or obovate, finely acute or shortly acuminate, subcoriaceous, minutely puberulous along the closely reticulated tertiary and quaternary nerves above, more palpably on the larger nerves and beneath; lateral nerves 16-20 on either half, slender but raised and conspicuous underneath, only slightly curved near the free outer extremities, tertiaries very fine, parallel, transverse to the secondaries; base rounded or subacute; petiole 3-4 in. long, swollen, finely channelled. *Cymes* short, leaf-opposed or often slightly below the level of the axils, usually 4-8-flowered; pedicels 2-3 in. long, densely buff-pubescent, bracteate about the middle. *Flowers* 3 in. long, pale-orange, sweet-scented. *Sepals* 15 in. long, broadly ovate-triangular, spreading, puberulous. *Petals* 2-25 in. long, broadly ovate, leathery, buff-silky outside, inner smaller, buff-puberulous outside especially at the tips. *Carpels* and their styles hairy.

Barpathar, Garampani and Tengalibam, SIBSAGAR and possibly in similar localities, generally along edges of glades or streams in ever-green forests.

The ripe fruit is eaten by the Mikirs.

Fls. 11-2. Fr. 7-9. (?)

6. *Melodorum rufinerve*, Hk. f. & Th.

An imperfectly known large woody climber with slender dark-coloured glabrous branchlets. *Leaves* 5-10 by 2-4 in., elliptic, tapering to an obtuse or acute point, rounded or retuse at the base, thinly coriaceous, glabrous above, minutely pubescent and glaucous beneath; lateral nerves 12-14 on either half, slender, arching; petiole 5-65 in. long, glabrous. *Flowers* minute in few-flowered, leaf-opposed pubescent cymes; pedicels 25 in. long with a small bracteole about the middle. *Sepals* broadly ovate. *Petals* fleshy.

Believed to occur in SYLHET and CACHAR.

FAM. 5. MENISPERMACEÆ.

Usually climbing or twining shrubs ; wood with broad, medullary rays and large pores in wedge-shaped groups. *Leaves* alternate, simple, entire or lobed, rarely distantly toothed, usually palminnerved, exstipulate. *Flowers* small, dioecious or polygamous. *Sepals* generally 6 in two whorls of 3, rarely 4-12, those of the outer whorl minute. *Petals* generally 6, similar to the sepals, exceptionally 3, or 3-5-8. **MALE FLS :** *Stamens* usually 6, opposite to the petals, free, or forming a column on which the anthers are borne. **FEM. FLS :** *Carpels* 3, distinct, rarely 1, 6 or more, usually 1-ovuled. *Staminodes* 6 or 0. *Style* terminal in flower, generally lateral or sub-basal in fruit. *Ripe carpels* drupaceous, 1-seeded. *Seed* curved, with a woody endocarp ; albumen even or ruminant or 0.

- I. *Leaves* ovate or orbicular, generally not much longer than broad :—

• A. *Leaves* peltate or sub-peltate, style scar basal or sub-basal :—

1. *Petals* free :—

Leaves generally glabrous.

Flowers in axillary pedunculate umbels, style 3-6 partite.

Leaves pubescent. *Flowers* in axillary panicles ; style 2-partite.

2. *Petals* connate in male flowers, solitary in female :—

Male flowers cymose, female racemed ; sepals 4 free ; style 3-fld. ✱

Flowers in axillary panicles :—

Male calyx 4-5 lobed. Male

petals 4-6.

Male calyx 4-lobed. Male petals 0.

- B. *Leaves* not peltate :—

1. *Style* scar terminal or sub-terminal ;

Flowers racemed, or paniced, generally axillary :—

Leaves glabrous. *Filaments* connate ; stigma capitate, seed flat.

Leaves glabrous or not. *Filaments* free : stigmas forked ; seed curved or ventrally grooved.

2. *Style* scar sub-basal. *Flowers* in axillary panicles. *Leaves* hairy at the nerve axils.

- II. *Leaves* oblong or oblong-lanceolate, generally 2-3 times longer than broad :—

- A *Leaves* coriaceous, acute or more or less rounded at the base glabrous (in the species here dealt with.) :—

Leaves 3-nerved at the base. *Flowers* paniced *Style*-scar sub-basal :—

Anthers cells bursting vertically. *Style* compressed.

• *Anther* cells, bursting transversely. *Style* cylindrical.

1. *Stephania*.

2. *Pericampylus*.

3. *Cissampelos*.

4. *Cyclea*.

5. *Lophophyllum*.

6. *Aspidocarya*.

7. *Tinospora*.

8. *Anamirta*.

9. *Limacia*.

10. *Cocculus*.

Leaves 3-nerved. Flowers racemed.

Leaves penninerved. Flowers in axillary fascicles or panicles.

B. Leaves membranous, generally sagittate at the base, softly pubescent beneath: style-scar sub-terminal.

1. **Exc.**—Leaves often elongate in some species of *Stephania* not included in this Flora and often not peltate in *Cissampelos Pariera*.

11. *Hæmatocarpus*.

12. *Pycnarrhena*.*

13. *Parabona*.

1. STEPHANIA, Lour.

(Glabrous climbers. Leaves peltate, orbicular or deltoid. Flowers in simple or compound axillary umbels. MALE FLS.: *Sepals* 6-10, free. *Petals* 3-5, fleshy. *Anthers* 6, forming a ring on the top of the column formed of connate filaments. FEM. FLS.: *Sepals* and *petals* 3 each. *Carpel* solitary; style 3-6 partite. *Drupe* globose, glabrous; endocarp horse-shoe shaped, dorsally tubercled.

Leaves elongate-deltoid, petiole not exceeding 2 in. in length; umbels lax, long-peduncled.

Leaves ovate-deltoid; petiole up to 4 in. in length; umbels capitate.

Leaves orbicular; petiole up to 7 in. in length; umbels cymose.

1. *S. elegans*.

2. *S. bernandifolia*.

3. *S. glandulifera*.

1. *Stephania elegans*, Hk. f. & Th. Vern. *Mi-soh-iong-rit*. Khasi.

A small climbing shrub; main stem spirally fluted; branchlets slender, slightly angled, glabrous. Leaves 2.5-4 by 1-1.7 in., peltate, deltoid, acute, usually truncate at the base, thinly coriaceous, glabrous, pale beneath; main nerves 4-6 beside the midrib, all basal; petiole 7-1.5 in.; slender. Flowers small, purple or greenish, in umbels with many rays; peduncles 1-2 in. long, very slender. *Drupe* red when ripe of the size of a pepper-corn, endocarp tubercled on the periphery.

KHASI HILLS, 5,000 ft.

Fls. 8-9. Fr. 3-4.

2. *Stephania bernandifolia*, Walp. Vern. *Tuhuk-lot*, Ass. (Siba.); *Galdun*, Ass. (Garó Hills) *Nimukha*, Beng. *Kharkha*, (Siba).

A climber winding clockwise round supports; branchlets glabrous, striate. Leaves 3-6 in. long, often as broad as long or broader, broadly ovate-deltoid, peltate membranous, wholly glabrous, or glabrous and vivid-green above and pubescent or thinly felted especially along the nerves, or pale or glaucous beneath, margins even or wavy; basal nerves 8-10, tertiary very finely reticulate; petiole 1-4 in. long. Flowers yellow; ultimate umbels often head-like with sessile flowers; peduncle axillary, 1-3 in. long. *Sepals* obovate. *Petals* 3-4. *Fruit* red when ripe, 3 in. diam., globose.

* Fairly common especially in the SIBSAGAR DISTRICT.

The roots have medicinal properties and the leaves are applied on boils and septic inflammations.

Fls. 2-4. Fr. 3-12.

3. *Stephania glandulifera*, Miers. Syn. *S. rotunda* Lour. Vern. *Gana-grjo*, Nep.; *Soh-pung-um-lang-sang*, Khasi.

A large climber with tuberous roots, and rather fleshy branches; tubers globose, deep-yellow inside. *Leaves* 3-6 in. diam., orbicular, sometimes broader than long, usually peltate often with repand or lobed margins, membranous, glabrous; basal nerves generally 9, intermediate nerves very slender and finely reticulate; petiole 3-7 in. long. *Flowers* about 2 in. diam., yellow; peduncles axillary, 1.5-4 in. long. *Sepals* narrow-cuneate, puberulous; *petals* shorter. *Drupe* globose, 1.5-2.5 in. diam.

Laluk, NORTH LAKHIMPUR; Nauduar Reserve, DARRANG; KHASI-HILLS; Bamba block, GOALPARA.

The tubers are medicinal and the leaves are eaten by cattle and goats.

Fls. 11-1. (?) Fr. 4-5.

2. PERICAMPYLUS, Miers.

***Pericampylus incanus*, Miers. Vern. *Goria-loti*, Ass. *Baral-prati* Nep.; *Mi-syntneg*. Khasi.**

A climber, grey-tomentose all over. *Leaves* 2-4 in. diam., orbicular or very broadly ovate, very narrowly peltate or not peltate at all, acute or obtuse, mucronate, membranous, pubescent or soon glabrescent above, grey-tomentose beneath, densely ciliate along the margins; basal nerves usually 5, tertiaries and quarter-naries very fine, minutely reticulate; base truncate or subcordate; petiole 1-2 in. long, tomentose. *Flowers* small in 2-3 crotomons cymes; peduncles axillary, fascicled, often superposed, 1-2 in. long, tomentose. *Sepals* 6 in 2 whorls, villous, inner spatulate. *Petals* 6, shorter than the sepals, cuneate, with recurved margins, pale-green. **MALE FLs.**: *Stamens* 6, free; anthers bursting transversely. **FEM. FLs.**: *staminodes* 6, clavate; *carpels* 3; style 2-partite. *Drupe* red, subglobose; style-scar sub-basal; endocarp horse-shoe-shaped, crested and echinate on the back.

Fairly common in NOWGONG and DARRANG, possibly also higher up the Valley; KHASI HILLS; CAHAR; GOALPARA.

The long branches are used in NOWGONG for tying purposes in house-building and are considered to be stronger and more durable than cane.

Fls. 4-5, Fr. ?

3. CISSAMPELOS, Linn.

***Cissampelos Pareire*, Linn. Vern. *Tubaki-lota*, or *Tubaki-lot*, Ass. (Sibs. & Lakh.); *Jyrmis-salla*, Khasi.; *Baral-panrhe*, Nep.; *Tupri-lewa*. Ass. (Kam.).**

A dextrorse climber which grows annually from perennial rootstocks; young parts usually tomentose or pubescent. *Leaves* 1-4 in. diam., orbicular, peltate or not, obtuse or sometimes retuse, mucronate at the apex, membranous or subcoriaceous, pubescent above, grey-tomentose beneath, or both surfaces glabrate especially the upper; base cordate or truncate, 5-7-nerved with minute reticulations between, yellow before falling; petiole as long as, or longer than the blade, tomentose or glabrate.

MALE. FLS. : cymose. *Sepals* 4-6. *Petals* 4, connate into a cup; *filaments* connate into a column with 4 connate *anthers* on top, which burst transversely. **FEM. FLS. :** racemed and crowded in the axils of leaf-like bracts. *Sepals* 2; *petals* 0 (or sepal 1 and petal 1), 2-nerved. *Carpel* 1; style 3-fid. *Drupe* '15-2 in. diam., obovoid-globose, compressed, hirsute, scarlet when ripe; style-scar near the base; endocarp horse-shoe-shaped with 4 rows of tubercles along the back.

Fairly common in all the DISTRICTS, especially on the MAJULI. (where however the variety with peltate leaves is rare). ascending to 2000 ft. in the KHASI hills.

The leaves and roots, are in used medicine.

Fls. 10-1. Fr. 3-5.

3. CYCLEA, Arnott.

Cyclea peltata, Hk. f. & Th.

A slender climber; branches longitudinally ribbed and pubescent or glabrate. *Leaves* 2-4 by 1·8-3 in., sometimes upto 7 by 5 in., deltoid or ovate, peltate, thinly coriaceous, glabrous or sparsely pilose above, glaucous and thinly pubescent beneath; basal nerves 9-13; petiole 1-2·5 in. long. *Flowers* small in axillary panicles 5-8 in. long. *Sepals* and *Petals* more or less connate; calyx exceeding the corolla. *Anthers* 4-6, connate and borne on the edge of the column formed by connate filaments. **FEM. FLS. :** *Sepal*, *Petal* and *carpel* 1 each, style with 3-5 radiating lobes. *Drupe* about '15 by '12 in., globose or obovoid, pilose; endocarp horse-shoe-shaped, tubercled; style-scar sub-basal.

The climber undoubtedly occurs in UPPER ASSAM but is liable to be mistaken for *Cissampelos Pareira* or *Pericampylus incanus*.

Fls. 7-9. Fr. 11-1.

5. LOPHOPHYLLUM, Griffith.

Lophophyllum bicristatum, Griff.

A large climbing shrub. *Leaves* 3-7 by 2·5-5·5 in., ovate, broadly cordate acuminate, firm and coriaceous, glabrous above rusty-pilose beneath, palmately 7-9-nerved from the base; petiole 1·5-4 in. long, thickened at both extremities. *Inflorescence* a slender tomentose compound panicle, axillary or from leafless nodes of the stem; *Flowers* minute. **MALE;** apetalous; **FEM.:** with 2 opposite lobed saccate sepals; buds '03 in. diam. *Anthers* 4-5, connate into a peltate disk. *Carpel* 1. *Drupe* '15-25 in. diam. orbicular, compressed, tubercled.

KHASI HILLS. *Hk. f. Th.* Apparently not very common. Distrib.—SIKKIM, BHUTAN, MANIPUR and BURMA.

Fls. 4-6. Fr. 8-10.

6. ASPIDOCARYA, Hk. f. & Th.

Aspidocarya uvifera, Hk. f. & Th.

A large evergreen climber; branches longitudinally ribbed. *Leaves* 4-6 by 3-5 in., ovate-cordate, tapering to an obtuse or

fine point, sometimes very narrowly peltate, thinly coriaceous, dark-green, glabrous or pubescent along the nerves beneath; basal nerves 5, tertiary laxly, but quaternaries very finely and closely reticulate; petiole 3-4 in. long. *Flowers* in very slender panicles from axils of fallen leaves. *Sepals* 12 in several rows, greenish, ciliate; *petals* 6, cuneate, concave. MALE FLS: *anthers* 6, on the top of the staminal column. FEM. FLS: *staminodes* 6, club-shaped. *Carpels* 3. *Drupe* '7-1 in. long, compressed, keeled on the back, surrounded by a toothed wing; seed oblong, flat.

Raigarh, near Dilmoor, N. E. FRONTIER; Jaipur Res., LAKHIMPUR, and possibly in other similar localities in those two DISTRICTS. Also Dikran Valley, DARRANG.

Fls. 2-4' Fr. 6-8.

7. TINOSPORA, Miers.

Succulent deciduous climbers with corky or papery bark, generally sending down long aerial roots from the branches of the tree on which they spread. *Leaves* generally cordate, not peltate, rather fleshy. *Flowers* in axillary or terminal racemes or panicles when the climbers are leafless. MALE FLS.: *Sepals*, *petals* and *stamens* 6 each, all more or less free; anthers oblique. FEM. FLS.: *Sepals* and *petals* 0; *staminodes* 6, club-shaped. *Carpels* 3. *Drupe* 1-3; style-scar terminal. *Seed* curved.

Leaves and new shoots glabrous:—

Bark corky, Stamens free. *Drupe* '3 in. long, globose; endocarp smooth.

1. *T. cordifolia*.

Bark warted. Stamens adnate to the base of petals.

Drupe 1 in. long, ellipsoid; endocarp tubercled.

2. *T. crispa*.

Leaves on both surfaces and young shoots hairy. Bark

papery. *Drupe* '4-5 in. diam., sub-globose; endocarp tubercled.

3. *T. malabarica*.

1. *Tinospora cordifolia*, Miers. Vern. *Hoguni-lot*, Ass.; *Gulanha*, Beng.

A large succulent climber with corky bark; young shoots glabrous. *Leaves* 3-4 in. long and as broad, orbicular or broadly ovate-cordate, acute or shortly cuspidate-acuminate, glabrous; petiole 1'5-2'5 in. long. *Flowers* greenish-yellow, glabrous. MALES fascicled: FEMALES solitary on longer pedicels. Bracts boat-shaped, the lower ones often leaflike. *Petals* cuneate. *Stamens* free; anthers oblong. *Drupe* 1-3, about '3 in. diam., globose, shortly stalked, red and glossy when ripe.

Not uncommon in riparian forests e.g., Majuli, DISTRICT SIBSAGAR.

A starchy extract is obtained from a cold infusion of the aerial roots and the thicker parts of the stem of this plant, which is much valued by Hindu physicians as a tonic febrifuge. Elephants are very fond of the aerial roots which act as a good tonic on them.

Fls. 2-4. Fr. 3-4.

2. *Tinospora crispa*, Miers. Vern. *Hoguni-lot*, Ass.

A large glabrous climber; stem warted. *Leaves* 2-6 by 1-4 in., ovate-oblong, shallowly cordate at base, glabrous; petioles

1-3 in. long. *Flowers* yellowish-green: bracts 15 in. long, subulate fleshy. *Stamens* adnate to the base of the petals; anthers square. *Drupe* about 1 in. long, ellipsoid, pale-yellow.

Occurs in similar localities as the foregoing species and probably possesses the same economic utility.

3. *Tinospora malabarica*, Miers. Vern. *Hoguni-lot*, Ass; *Pherua-mek-rikang*, *Phuroi-rikang*, Mikir; *Daoihuli*, Kach; *Wapel-ek-rang*, Kuki.

A large fleshy climber; bark papery, usually with lenticels which are often 4-fid; young shoots pubescent. *Leaves* 3-5 in. long and nearly as broad, broadly ovate or orbicular, cordate but abruptly truncate or cuneate and 5-7 nerved at the base, suddenly acute or acuminate; pubescent above and whitish-tomentose beneath; main lateral nerves 1 or 2 on either side of the midrib; ultimate reticulations minute; petiole 2.5-4 in. long. *Flowers* green, on racemes 1.5-4 in. long. *Mature carpels* 1.3, 4-5 in. diam., globose, turning at first yellow then bright crimson in ripening; endocarp tubercled.

Throughout UPPER ASSAM: the commonest species of this genus. The stem ~~is~~ sweetish but is likely to possess the same medicinal properties as *T. cordifolia*.

Fls. 2-3. Fr. 3-5.

Tinospora Masterellii, Diels. Pflanzenreich 46. Heft. p. 140 Syn. *T. crispa*, Miers. in part.

A climber with reddish brown warted bark. *Leaves* suborbicular acuminate membranous usually glabrous, 4-6 in. across, base retuse or subcordate, 5-7 nerved, lateral nerves usually 2 above the basal, prominent beneath. *Flowers* unknown. *Female* inflorescence racemose, 2-3 in. long, pedicels 5-8 in. long, stout. *Drupe* juicy and fleshy, endocarp crustaceous, subreniform about 6 in. long.

Griffith, ASSAM!

Fls. 8.

8. ANAMIRTA, Colebr.

Anamirta paniculata, Colebr. Vern. *Kakmari*. Beng. *Kakamari*, (crow's bane). Sans.

A powerful climber, wholly glabrous (except the axils of the nerves on the undersurface of the leaves); bark on old stems spongy outside and deeply cracked, smooth on branches, often sending down numerous rootlets. *Leaves* 3-10 by 2.5-8 in., ovate, shallowly cordate or truncate, bluntly sub-acute, coriaceous, glabrous, 3-5 nerved at the base, with 4-5 lateral nerves on either side of the midrib the axils of which are hairy, tertiaries indistinct; petiole 1-5 in. long, generally twisted at the base. *Panicles* 12-15 in. long, drooping from the old branches. *Flowers* green, scented, about 2 in. diam, glabrous; buds globose, 1 in. diam. MALE: apetalous but with 6 deciduous sepals; stamens numerous with 2 celled anthers round the top of a central column. FEMALE: with 9 club-shaped staminodes, all in one series; *carpels* usually 3 on a short gynophore; style lateral. *Drupe*s

usually in pairs, 4-6 in. long, subglobose or reniform, black, on stout stalks; endocarp rugose; albumen oily.

Occurs in the same localities as *Tinospora cordifolia* and liable to be mistaken for it: also in the Khasi Hills.

The fruit is very bitter and is used to poison crows and fish. The oil of the seeds is said to be used for industrial purposes. An ointment prepared from the berries is used as an insecticide and in cases of obstinate skin diseases.

Fls. 5-9. Fr. 11-12.

9. LIMACIA, Lour.

Limacia cuspidata, Hk. f. & Th.

A somewhat stiff climbing shrub of the habit of *Smilax*; branchlets striate; very young shoots pubescent. Leaves 2-4 by 8-15 in., ovate elliptic or lanceolate, acuminate, coriaceous, glabrous, glossy, 3-nerved and more or less rounded at the base with only 1 or 2 lateral nerves on either side of the midrib; petiole 4-6 in. long. Panicles:—MALE: 8-13 in. FEM.: 5-6 in. long, from supra-axillary villous tubercles; rachis hairy; bracts minute. Sepals 6 in two series. Petals 6, much smaller than the sepals. Stamens 8-12 (Kurz).; carpels 3. Drupes 4 in. long, globose, slightly compressed; style-scar near the base; seed curved; endocarp faintly tubercled.

Only once found by the writer on the western bank of the Gaurisagar tank. SIBSAGAR DISTRICT.

Fls. 6-7. (?) Fr. 9-10.

10. COCCULUS, DC.

Climbing shrubs, often sub-herbaceous, rarely small trees. Flowers axillary or infra-axillary, in short cymes or panicles, rarely racemose. Sepals 6 in two series, the inner larger. Petals 6, auricled at the base. Stamens 6, embraced by the auricles of the inner petals; anthers sub-globose, cells bursting transversely. Carpels 3-6; drupes compressed, horse-shoe-shaped, keeled and tubercled on the back; style-scar sub-basal.

Climbing shrubs:—

Leaves broader than long, glabrous. Panicles 6-24 in. long from old stem. Drupe 1 in. long, obovoid-oblong.

1. *C. macrocarpus*.

Leaves ovate glabrate. Panicles axillary, shorter than the leaves. Drupe 2 in. diam., tubercled.

2. *C. mollis*

A small tree:—

Leaves lanceolate, shining. Panicles axillary, Drupe minute, globose.

3. *C. laurifolius*.

1. *Cocculus macrocarpus*, W & A.

A large woody climber; old stem with papery outer bark; branches dark-grey, striate. Scales 2-3.5 by 2.2-4.5 in. generally broader than long, rhomboid to broad-ovate, chartaceous, glabrous, shining above, glaucous or pale beneath; base truncate or cordate, 5-nerved; petiole 1-2.4 in. long. Panicles

6-24 in. long, pendulous from the old stem. *Flowers* small, pale-yellow. *Ripe carpels* obliquely obovoid. '8-1 by '4-5 in., drying with an elongated depression in the centre; stone with transverse ridges.

KHASI HILLS, *Brandis* !

Fls. 2-5. Fr. 7-9.

2. *Cocculus mollis*, Wall, Vern. *Jyrm-mailum*, Khasi.

Branchlets blackish, slender, striate, pubescent. *Leaves* 1'5-4 by 1-2'2 in. ovate, acute or acuminate, truncate or suddenly cuneate, 3-5-nerved at the base, rarely cordate, thinly chartaceous, bright-green above, glaucous beneath, glabrate; lateral nerves 2-3 above the basal; petiole '6-1 in. long, slender. *Panicles* usually axillary never exceeding the leaves, few-flowered. *Petals* notched. *Drupe* '2-25 in. diam., very shortly pedicelled, laterally compressed, sculptured on the back and with four lines of tubercles along the sides.

KHASI HILLS, 5,-6,000 ft., e. g., Sadew, Mawphlang etc.

Fls. 6-7. Fr. 9-10.

3. *Cocculus laurifolius*, DC.

A small evergreen tree with short trunk; branchlets grey or dark-brown, angled, uniformly striate, often pendulous, with a tuft of hairs at the base. *Leaves* 3-6 by 1-2 in., oblanceolate or elliptic, firm and chartaceous, glabrous, dark-green above, lighter green beneath, cuneate and 3-nerved at the base; petiole '15-5 in. long, often bearded at the base, *Panicles* axillary, solitary or 2 together, corymbose. *Flowers* minute; petals 2-lobed. *Styles* reflexed. *Drupe* '15 in. diam., black when ripe; endocarp rugose.

Amteka in the Bijni Reserve, GOALPARA. Probably also in other similar Sub-Himalayan swamps.

The wood has belts of bast tissue alternating with woody bands, simulating annual rings. They often anastomose or are spirally disposed on a transverse section. The wood can only be used as fuel.

Fls. 4-6. Fr. 9-12.

HÆMATOCARPUS, Miers.

Hæmatocarpus Thompsoni, Miers. Vern. *Inramji-dukha*, Kach.

A very large woody climber spreading over the tallest trees; bark pale grey or brown somewhat rough, branches stout, wood consisting of consecutive layers of thin radiating plates. *Leaves* 3-6 by 1'5-2'5 in., oblong, bluntly acuminate, with an acute or obtuse 3-5-nerved base, rigidly coriaceous, glabrous, pale beneath; basal nerves running nearly to the apex, minor nerves conspicuous. *Flowers* dioecious, small, in axillary or supra-axillary solitary or fascicled racemes; pedicels slender. *Sepals* 9-12 in the male flowers, ciliate. *Petals* 6, concave, with an auricled base. *Stamens* 6; anthers 2-celled. *Female flrs.* not seen. *Fruiting racemes* woody and stout, up to 15 in. long. *Drupe* solitary or 2-4 together, 1'5-2 in. long by 1-1'3 in. diam., on stout stalks '5 in.

long, oblong, oblique, dark-red outside and full of copious blood-red juice when ripe; style-scar about half way down the drupe; endocarp somewhat flat, crustaceous, densely fibrous.

Barail Reserve, NORTH CACHAR HILLS; also KHASI HILLS. Not common.

The ripe fruit which is full of a sweetish blood-red juice is eaten by the local people.

Fr. 4-5.

12. PYCNARRHENA, Miers.

Pycnarrhena pleniflora, Miers. Vern. *Holok-lota*, Ass. (N. Lakh.)

A woody climber which generally creeps on its supports; branches finely striate, pubescent. *Leaves* 5-7 by 1.5-2.5 in., oblong-lanceolate or oblanceolate, abruptly blunt acuminate, thinly coriaceous, wholly glabrous or puberulous on the midrib beneath, shining above; main lateral nerves 7-9 on either side of the midrib, the lowest pair subbasal, depressed above, very prominent beneath, interlacing to form intermarginal loops, tertiaries laxly and quaternaries very minutely reticulate (meshes about 50 along an inch length); base cuneate; petiole 4-5 in. long, swollen and channelled below, sub-terete. *Flowers* white, diœcious, axillary, fascicled. **MALE**: fascicles sometimes forming short congested panicles, *bracts* 3. *Sepals* 6, inner 3 larger, orbicular, concave. *Petals* 6, sometimes 5, small lobed; *anthers* 6-9, 4-lobed subsessile. **FEMALE**: on 1-2 flowered fascicled, bracteate, filiform, pubescent peduncles about .25 in. long; *bracts* 9, hairy; *sepals* 3, concave; *petals* 6, much smaller; *staminodes* 6 (?). *Drupe*s .5 in. (?) long, broadly oblong, smooth style scar lateral, endocarp and seed reniform.

Mahmora, Gaurisagar tank and Majuli, SIBSAGAR DISTRICT: Panigaon and Bhoreli Reserve, NORTH LAKHIMPUR.

Fls. 2-4. Fr. 5-6 (?)

13. PARABÆANA, Miers.

1. *Parabœna sagittata*, Miers. Vern. *Chabailai-daugurung-gedebe*, Kach.

A rather slender climber, with milky juice; branches longitudinally ribbed. *Leaves* 3-8 by 2-4 in. ovate-cordate or sagittate, acuminate, entire or distantly toothed, membranous, glabrous or glabrescent above, softly tomentose beneath, basal nerves 7 besides 3-5 lateral nerves on either side of the midrib; petiole 1-4 in. long. *Flowers* small, axillary or slightly supra-axillary, solitary or geminate, few or many flowered, dichotomous cymes; common peduncles up to 1 in. long. *Sepals* 6, sub-equal, subacute. *Petals* cuneate, often lobed. **MALE**: *anthers* 6, horizontal on the top of the staminal column. **FEMALE**: *staminodes* 6, *Carpels* 3; *style* recurved. *Drupe*s 2-2.5 in. long, globose; style-scar subterminal; endocarp subglobose, sharply tubercled on the back.

Lanka and other places in the neighbourhood of Lumding. DISTRICT NOWGONG; also KHASI HILLS up to 2000 feet.

Fls. 5-7. Fr. 10-11.

Tinomisium micranthum, Diels in *Pflanzenreich*. Heft 46, P. 119.

A climber with deeply sulcate branches, young parts ferruginous pilose. *Leaves* 5.5-6.5 by 2.5-3 in. ovate oblong or narrowly ovate lanceolate, acuminate, glabrous above puberulous specially on the nerves beneath, chartaceous, base rounded to broadly cuneate, with 3-5 nerves, lateral nerves 2-3 (above the basal) on either side, ascending prominent on the undersurface; petioles 2-2.5 in. long. *Male flowers* in pubescent spicate racemes 1.5-2.5 in. long, several of which are fascicled together from nodes on old wood. *Sepals* 9, 3 outer small, externally pubescent, inner 6 oblong, about .05 in. long. *Petals* 6, with involute margins, glabrous, slightly smaller than the sepals. *Stamens* 6, opposite the petals, free, subequal; filaments short, thick, dilated towards the apex; anthers introrse. *Female flowers* and drupe not seen. (In the genus, the female flowers have the sepals and petals similar to those of the male flowers; staminodes 6. *Carpels* 3, glabrous, stigma peltate-capitate. *Drupe* 3 or few aborted, compressed, exocarp fleshy, endocarp crustaceous dorsally convex, ventrally flat or slightly concave, not intruded; seeds with large flat cotyledons).

Rajbari, Assam, Watt. 11267 (the type for the species)!

Flrs. 3.

FAM. 6. BERBERIDACE.

Erect or climbing glabrous shrubs. *Leaves* alternate or fascicled, simple or compound, exstipulate. *Flowers* regular, yellow green or white. *Sepals* and *petals* free, hypogynous, caducous, in several series, usually imbricate. *Stamens* hypogynous, usually as many as the petals and opposite to them. *Carpels* 1-3, oblong; *style* short or 0; *stigma* dilated. *Fruit* usually baccate.

Climbing shrubs: leaves digitate. Flowers 1-sexual:

carpels 3:—

Stamens monadelphous. Leaflets up to 7.

Stamens free. Leaflets up to 9.

Erect shrubs. Leaves simple, pinnate or 2-3 pinnate.

Flowers 2 sexual: carpel 1:—

Armed shrubs. Flrs. yellow, solitary, fascicled or racemed:—

Leaves simple.

Leaves pinnate.

Unarmed shrub. Flrs. white, in panicles:—

Leaves 2-3 pinnate.

.. 1. *Stauntonia*.

.. 2. *Holboellia*.

.. 3. *Berberis*.

.. 4. *Mahonia*.

.. 5. *Nandina*.

1, STAUNTONIA. DC.

Glabrous, climbing shrubs. *Leaves* alternate, digitate or pinnate; leaflets 3-7, petiolulate, entire, generally glaucous or pale beneath. *Racemes* axillary, solitary, or fascicled. *Flowers* 1-sexual. **MALE:** *Sepals* 6 in 2 series, linear. *Petals* 0. *Stamens* monadelphous. **FEM.:** *Carpels* 3. *Seeds* large, imbedded in a yellowish pulp; testa horny, black.

Leaves pinnately 3-foliolate:—

Racemes solitary or few.

Racemes numerous, fascicled.

Leaves digitately 3-7-foliolate.

1. *S. Brunoniana*.

2. *S. elliptica*.

3. *S. filamentosa*.

1. *Stauntonia Brunoniæ*, Wall.

A large climber; old stem softly grey-corky; branches often tubercled. *Leaves* pinnately 3-foliolate: leaflets 2.5-5 by 1-1.5 in. narrow elliptic or lanceolate, caudate-acuminate, entire, glabrous and shining above, somewhat glaucous beneath; nerves 6-8 on either side of the midrib, the first pair being basal, prominent beneath, midrib depressed above; petiole 2-5 in. up to the lowest pair of leaflets; petiolules of the latter .5-.7 in. long. *Racemes* solitary, or a few from scaly tubercles; rachis slender somewhat zigzag. *Flowers* greenish-yellow, .3-.6 in. across on very slender pedicels. .2-.3 in. long. *Ripe carpels* about 2 by 1 in., ovoid or oblong, many-seeded; seeds black, 3-gonous, immersed in a yellow pulp.

Sadiya, N. E. F. DISTRICT; Balijan, SIBSAGAR DISTRICT: KHASI HILLS. *Griffith! Hooker! etc.*

Fls. 8-10. Fr. 2-6.

2. *Stauntonia elliptica*, Hemsl. Syn. *Paravatia Brunoniana*, Decaisne. Vern. *Krang-sin-douha*, Kach.; *Jong-mot*, Kuki.

A large climber; branchlets striate. *Leaves* pinnately 3-foliolate; common petiole 2.5-5 in. long to insertion of leaflets, swollen and callous at the base; leaflets 2.5-4.5 by 1.4-2.7 in. elliptic or ovate, acute or rounded at the tip, subcoriaceous, glabrous, shining above, glaucous beneath; margins slightly recurved, lateral nerves 6-8 on either half, slender, the first pair or two subbasal with lax reticulations between; base as a rule rounded; petiolules lateral .4-1 in., terminal 1-2 in. long, swollen and callous at both extremities. *Racemes* 3-4.5 in. long in fascicles of 5-12 from imbricately bracteate axillary tubercles. *Flowers* greenish-yellow about .3 in. across, on filiform pedicels .2-.4 in. long. *Sepals* 6, ovate or elliptic, longitudinally ribbed. *Petals* 6, smaller than the sepals. *Stamens* 6, monadelphous. *Young fruit* of 3 distinct carpels; *mature* generally solitary 3-4 by 2 in.; seeds dark-brown or almost black, shining, irregularly faceted, with a thin grey papery arillus (or exocarp?), imbedded in yellow pulp.

Garampani, Diphling, and Balijan, SIBSAGAR; Gauhati, KAMRUP; Sadiya and Dismor, N. E. FRONTIER; Haflong, N. CACHAR HILLS; Cherrapunji, KHASI HILLS.

Fls. 8-11. Fr. takes 12 months to mature.

3. *Stauntonia filamentosa*, Griff.

A large climber with thick striated branchlets. *Leaves* digitately 5-foliolate; common petiole 3-6 in. long, swollen at the base; leaflets 5-7 by 2.2-3.4 in., oblong obovate, suddenly acuminate with a short tail, subcoriaceous, glabrous and green above, minutely densely glandular puberulous beneath; main lateral nerves about 10 on either side of the midrib, the first pair subbasal and continuous with the intermarginal loops of the other nerves; reticulations lax; petiolules .8-1.7 in. long, the terminal being the longest. *Flowers* and *fruit* not seen.

Upper Dehing Reserve, also Tingrai, LAKHIMPUR.

2. HOLBELLIA, Wall.

Holbellia latifolia, Wall. Vern. *Soh-lygn-kart*, *Mi-rang-k'sa*, Kh.; *Soh-tymbra*, Synt.; *Kram-sim-doukha*, Kach.

A fairly large climbing shrub; stem corky when old. *Leaves* alternate, digitate, 3-9-foliate. *Leaflets* very variable in size and shape, 3-5 by 1.5-2 in., broadly ovate, oblong or ovate-lanceolate, acuminate, coriaceous, glabrous, somewhat shining above, pale beneath, usually 3-nerved at the base; common petiole 3-7 in., petiolules 3-1 in. long. *Flowers* monœcious, green or purplish-green, sweet-scented, in axillary fascicles or racemes 1.5-4.5 in. long; pedicels 5 in. long, slender. *Sepals* 6 in 2 series. *Petals* 6, minute, orbicular. *Stamens* 6, free; anthers 2 in. long, apiculate extrorse, opening by slits. *Carpels* 3; stigmas oblong; placentation parietal. *Ripe carpels* berry-like, 2-3 in. long, of the shape and size of a small plantain; seeds black, generally compressed, imbedded in a yellow edible pulp.

KHASI and JAINTIA HILLS between 4, and 6,000 ft., e. g., Jarain, Laitsoham, Khimawrah, Um Risa, etc. Also NORTH CACHAR HILLS. e. g., Haflong, Gunjong, etc.

Fls. 2-5. Fr. 9-11.

There are two varieties of this plant.—Var. 1.—*latifolia* and Var. 2.—*angustifolia*, but only the former occurs in our area and the above description refers to it alone.

3. BERBERIS, Linn.

Berberis Wallichiana, DC. Vern. *Dieng-niang-mat-shynrang*, Kh.

An erect spinous shrub 6-10 ft. high; branches sharply angled. *Leaves* simple, generally in fascicles of 3-4 from tubercles in the axils of alternate 3-partite spines, 2-3 by .5-.75 in., oblong or oblong-lanceolate, acute at both ends, chartaceous or subcoriaceous, glabrous and shining on both surfaces usually serrulate with very sharp spines, sometimes entire; lateral nerves very faint; petiole 1 in. long, flattened and channelled. *Spines* 1-1.5 in. long. *Flowers* yellow, bisexual on 1-fld. axillary peduncles; peduncles in fascicles of 10-15, 3-5 in. long, red, slender, filiform, jointed at the top glabrous and shining. *Sepals* 6, petaloid, imbricate, in two series. *Petals* 6, in two series glandular at the base. *Stamens* 6, free, sensitive, anthers opening by two 1-curved valves. *Ovary* simple, stigma subsessile, broad; ovules basal, erect. *Berries* 3 by .15 in., oblong-ellipsoid, deep purple when ripe.

This plant has four varieties only one of which Var. *microcarpa* occurs in the KHASI HILLS above 5000 ft. e. g. Mowphlang and the above description refers to it only.

The wood of this and the next species are yellow.

Fls. 8-9. Fr. 9-10.

4. MAHONIA, Nutt.

Mahonia nepalensis, DC. Syn. *Berberis nepalensis*, Spreng. Vern. *Dieng-phuh-rnong*, *Dieng-niang-mat*, *Dieng-soh-riang-mat-kynthei*, Kh.; *Dieng-la-ranong*, *Dieng-larnong*, Synt.; *Lek-chutra*, Nep.

An erect shrub or sparingly branched small tree with soft corky bark, leafy only towards the extremities of the thick branchlets. *Leaves* 6-18 in. long, sheathed at the base with a pair of subulate stipules. *Leaflets* 2-12 pairs besides the terminal one, 2-4 by 1-1.8 in. ovate-oblong or lanceolate, sessile, firmly coriaceous, glabrous, shining above, pale beneath, with 3-8 large spinous teeth on either side, strongly 3-5 nerved from the base areoles very large. *Flowers* yellow, about 2 in. long, fascicled in erect dense flowered racemes. *Racemes* 4-10 in. long, erect, each from the axil of a bract. *Bracts* 1-2 in. long, hyaline persistent, covering the ends of the branchlets; bracteoles small broadly ovate or oblong, concave, deciduous; pedicels 3-5 in. long. *Sepals* 6, petaloid, imbricate in two series, elliptic. *Petals* 6, in two series, glandular at the base. *Stamens* 6, sensitive; anthers dehiscing by ascending valves. *Ovary* 1-celled; style short, stigma capitate, large. *Berries* 3-5 in. long, elliptic or globose, purple with glaucous bloom.

KHASI HILLS 4-5000 ft. on sunny spurs and open hill slopes.

Firs. 10-11. Fr. 11-1.

Takeda (Notes from the Royal Botanic Gardens Edinburgh, Volume VI. P. 215-224) maintains that the plants grouped under this name consists of a number of species. According to him *M. nepalensis* has not been hitherto collected outside Nepal. The plant described under this name should be called according to this view *M. pycnophylla*, Takeda, *M. nepalensis* var. *pycnophylla*, Fedde.

M. nepalensis is said to differ from our plant by its less coriaceous and somewhat narrower leaflets with more spines, larger bracts which are oblong to ovate oblong, obtuse and about 1.5-2.4 in. long and more ovules (4-5 instead of 2).

Mahonia acanthifolia, Takeda. Notes from the Royal Botanic Gardens. Edinburgh. Vol. VI. p. 219.

Differs from the plant described as *M. nepalensis*, DC. by its more numerous leaflets (up to 11 pairs) with few large teeth, and flowers with very small outer sepals. Punduah, (Khasi Hills) Wallich 1820, No. 1450C. There is no duplicate sheet at Calcutta herbarium.

M. manipurensis, Takeda. Notes from the Royal Botanic Garden Edinburgh P. 222.

Leaflets 5-9 pairs, 1.2-2.4 by 1.2-1.2 in. ovate to broad ovate, margins with few strong teeth, base truncate to subtruncate, or more or less cordate, 5-8 nerved, coriaceous. *Racemes* in fascicles of 5-8 up to 4 in. long, stout, dense flowered. *Bracts* ovate up to 2 in. long, outer sepals ovate, larger inward, 1.5-3 in. long, 3-5 nerved. *Petals* oblong, ovate, bifid at the apex up to about 27 in. long. *Ovary* with short style, 1-3 ovuled, *Fruit* unknown.

MANIPUR, Watt.

Flowers cold season.

M. Simonsii, Takeda. Loc. cit p. 222.

Leaflets 6-9 pairs, 2.75-4.25 by 1.2-1.2 in. lowest pair much smaller close to the stipules, distant from the next upper pair: lanceolate, long acuminate, lower half of base rounded upper half subuncate, margins serrate dentate, slightly glossy, coriaceous, nervules conspicuous. *Racemes* in fascicles of about 8, up to about 6.25 in. long, sometimes branched towards the base, somewhat lax flowered; pedicels 2-2.5 in. long, slender much exceeding the minute triangular acute bracts. *Outer sepals* very small inner gradually longer about 2-2.7 in. long, elliptic oblong obovate. *Ptals* oblong, about 2 in. long, bifid at apex, nectaries minute. *Stamens* slightly shorter than the petals; filaments a little longer than than the anthers. *Ovary* short styled, 3 ovuled. *Fruit* unknown.

Myrung, Simmons!

It is easy to distinguish from its, lanceolate acuminate leaflets with prominent nervules which are as strong as the main nerves and the minute bracts much smaller than the slender pedicels.

Flowers 11.

The description has been based on a single sheet in Calcutta herbarium which is also the type sheet for the species.

5. NANDINA. Thunb.

Nandina domestica. Thunb., the *Sacred Bamboo* of the Chinese, is an unarmed ornamental shrub, 3-6 ft. in height, with 2-3 pinnate evergreen leaves and small white flowers in large terminal panicles. It is a native of China and Japan, but is often grown at Shillong.

Fls. 5-7.

FAM. 7. NYMPHÆACE.

Aquatic herbs with perennial rootstock. *Leaves* usually floating, often peltate, with involute margins in bud. *Flowers* solitary, borne on a naked scape. *Sepals* 3-5, free. *Petals* 3-5 or, numerous, free, coloured. *Stamens* many. *Carpels* 3 or more, free or connate or sunk in pits of the disk; ovules few or many. *Fruit* various; seeds naked or arillate; albumen floury or 0, embryo enclosed in a sac.

- | | |
|---|---------------------------|
| Sepals and petals 3 each. Carpels free; ovules few. Seeds albuminous | ... 1. <i>Brasenia</i> . |
| Sepals 4-5. Petals and stamens indefinite :—
Ovary interior; carpel connate; ovules many.
Seeds albuminous :—
Sepals deciduous. Seeds minute, very numerous. | ... 2. <i>Nymphaea</i> . |
| Sepals persistent. Seeds large, 8-20. | ... 3. <i>Euryale</i> . |
| Sepals 4-5, Petals and stamens indefinite ;
carpels sunk in pits of the superior turbinate spongy disk. Seeds exalbuminous, | ... 4. <i>Nelumbium</i> . |

1. BRASENIA, Schreber.

Brasenia peltata, Pursh.

A slender plant with branching stem. *Leaves* alternate, 2-4 in. long, elliptic-oblong, floating; petiole covered with mucus. *Flowers* red, 1 in. diam.; peduncles axillary, pubescent, covered with mucus. *Sepals* 3, pubescent. *Petals* 3, red, linear. *Stamens* 12-18; anthers opening by lateral slits. *Carpels* 6-18, cylindrical; ovules 2-3, pendulous; carpels indehiscent. *Seeds* albuminous.

KHASI HILL in the neighbourhood of Nongkrem, 4,500 ft.

2. NYMPHÆA, Linn.

Large herbs with creeping rootstock. *Leaves* usually peltate or subpeltate. *Flowers* showy, white, red or blue, floating, supported by long cylindrical radical scapes. *Sepals* 4, adnate to the base of the disk. *Petals* 10-30, in many series, the inner gradually narrower and ultimately passing into stamens. *Stamens* indefinite; filaments flattened at the base; anthers introrse, opening by lateral slits. *Carpels* many, confluent with the disk. *Fruit* a spongy berry. *Seeds* minute, buried in pulp, with a fleshy aril.

Leaves large, 6 in. and over in length:—

Leaves sharply sinuate-toothed. Flowers white or red. Sepals obtuse, ribbed; anthers without appendages.

.. 1. *N. Lotus*.

Leaves entire or obtusely-toothed. Flowers blue or white. Sepals veined, not ribbed; anthers with long appendages.

.. 2. *N. stellata*.

Leaves up to 2 in. in length, entire. Sepals obtuse; anthers without appendages.

.. 3. *N. pygmaea*.

1. *Nymphæa Lotus*, Linn. Vern. *Mokuwa*, Nal, Ass.; *Nial*, Shaluk, Beng. *Kumuda*, Sans. For Var. *rubra*—*Rakta-kamal*, Beng.; *Raktotpala*, Sans.

Corms nodular, 3-4 in. diam. *Leaves* 6-12 in. broad, oval or orbicular, sagittate when young, usually pubescent beneath, strongly veined. *Flowers* usually 3-5 in. diam., white or red. *Sepals* oblong, greenish outside with 5-10 white ribs. *Petals* oblong to linear. *Filaments* broadly subulate. *Carpels* 10-20. *Seeds* ellipsoid, rough.

Throughout the plains of ASSAM in still water of hills and tanks. Var. *rubra* is, however, somewhat rare, specially in the BRAHMAPUTRA VALLEY. The tubers are eaten raw or roasted and the dried seeds after parching.

Fls. 8-10. Fr. 9-11.

2. *Nymphæa stellata*, Willd. Vern. *Sundi*, *Nil-padma* Beng. *Nilotpala*, Sans. The fruit *Dhemp*, Ass.

Corm 2-3 in. long, ovoid, not nodular. *Leaves* orbicular or elliptic, usually blotched with purple beneath, entire or slightly sinuate, glabrous; veins not so strong but more closely reticulate than in *N. Lotus*. *Flowers* 2-3 in. diam., usually light-blue, sometimes white or pink. *Sepals* not ribbed, often streaked with fine purple lines. *Petals* 10-30. *Stamens* 10-50; appendage of anthers often foliaceous. *Fruit* 13-30-celled; seeds striate.

Occurs in the same localities as the preceding species but generally in shallower water.

The tubers and seeds are used in the same ways as those of *N. Lotus*.

Fls. 8-10. Fr. 9-11.

3. *Nymphæa pygmaea*, Aiton.

A very small herb; rootstalk with soft, black hairs. *Leaves* 1-2 in. long, oblong-orbicular, with two diverging acute lobes from the base. *Flowers* white, 1.5-2 in. diam. *Sepals* 4, obtuse. *Petals* 8-10, obtuse. *Stamens* in 3-4 series, without appendages. *Stigmatic rays* 4-8, spoon-shaped.

In swamps in the KHASI HILLS. 4-6000 ft.; e.g., Nongkreim.

3. EURYALE, Salisb.

Euryale ferox, Salisb. *Shriew-u-pubon*, Khasi ; *Pukhal*, Sylh.

A very prickly aquatic herb ; rootstalk fibrous. *Leaves* 12-18 in. diam., orbicular, floating, green and glabrous but bullate and corrugated above, pink or deep-purple beneath, supported by stout but very porous interlacing ribs ; stout, recurved prickles on both surfaces along the ribs ; petiole prickly, pink or deep-green. *Flowers* about 2 in. diam., violet-blue or red. *Torus* prickly. *Sepals* 4, inserted above the ovary. *Petals* in many series passing into the stamens which are in bundles of 8. *Carpels* 8. *Fruit* spongy, prickly outside. *Seeds* about 20, arillate ; albumen farinaceous.

In tanks and iheels in SYLHET, CACHAR and the KHASI HILLS.

The seeds are considered good food for invalids and are eaten raw or roasted.

Fls. 5-7. Fr. 6-8.

4. NELUMBIUM, Tuss.

Nelumbium speciosum, Willd. Vern. *Podum* Ass ; *Padma* Beng. & Sans. ; *Soh-lapudong*, Khasi.

A large aquatic plant with milky opaque juice ; root-stock stout, creeping. *Leaves* peltate, 1·5-3 ft. diam., young generally raised above the water, old floating, often with scattered weak prickles ; petiole as long as the water is deep. *Sepals*, *petals* and *stamens* numerous, passing gradually into one another ; anthers clavate. *Carpels* many, 1-celled, sunk in the flat top of the large obconic extremity of the torus ; ovules 1-2. *Ripe-carpels* 3·5 in. long, ovoid, loose in the cavities of the enlarged spongy torus ; albumen 0 ; cotyledons fleshy ; plumule folded and enclosed by the cotyledons.

Throughout the PROVINCE up to 2000 ft. elevation.

The ripe carpels are eaten, raw or cooked. The flower is considered very sacred by the Hindus and Jains and is in much demand for worshipping or for decorating their temples.

Fls. 6-9 Fr. 11-12.

FAM. 8. PAPAVERACEÆ.

A small family of herbaceous plants with milky or yellowish juice. *Leaves* radical or alternate, exstipulate, lobed or cut. *Flowers* regular, 2-sexual. *Sepals* 2, rarely 3, concave ; perianth and stamens caducous, the later very numerous ; anthers erect, with lateral dehiscence. *Ovary* 1-celled or spuriously 2-4-celled by lamelliform placentas ; style very short or 0 ; stigmas radiating ; ovules in many series, parietal, anatropous. *Capsules* dehiscing by pores or valves ; seeds very small, with only albumen.

This Family of showy flowers is very poorly represented in Assam. The famous drug opium is obtained from scratches made on the capsules of

Papaver somniferum, Linn. Although the drug is much consumed the plant is not cultivated in Assam. Some beautiful strains of this plant are grown in gardens, specially in the HILLS.

The following is the only plant which was originally introduced from Mexico, and has now been naturalized in most parts of India.

ARGEMONE, Linn.

Argemone mexicana, Linn. Vern. *Kuhumkanta*, Ass. ; *Siyal-knata*, Beng. ; *Samshu*, Kach.

An erect thistle-like annual, 2-4ft. high, with bluish leaves and yellowish juice, *Cauline leaves* alternate 3-6 in. long, sessile or half-amplexicaul, pinnatifid, the lobes being further divided into large sections or teeth with sharp prickles at their apex. *Flowers* golden-yellow, 1.5-2 in. diam. *Sepals* 2 or 3 cuspidate. *Petals* 4 or 6. *Style* thick, very short ; stigma 4-7-lobed ; ovules on 4-7 parietal placentas. *Capsules* 8-1.5 in. long, oblong, usually prickly, dehiscing by short valves opposite each stigmatic lobe.

On dry waste lands throughout the PROVINCE. An oil can be expressed from the seeds which is used for lighting and possesses laxative properties. An infusion of the leaves and the yellow juice are also used medicinally.

Fls. 1-6 (chiefly). Fr. 3-6.

FAM. 9. FUMARIACEÆ.

Herbs with watery juice. *Leaves* divided or dissected, sometimes decompoundly. *Flowers* irregular, 2-sexual, in racemes. *Sepals* 2, small, scale-like, deciduous. *Petals* 4, in 2 very dissimilar pairs, one or both of the outer pair spurred gibbous, the inner pair often cohering by their tips. *Stamens* usually 6 and 2-adelphous ; anthers 2-called on the middle stamen of each bundle, 1-called on the other 4. *Ovary* 1-celled ; ovules 3 or more, amphitropous, parietal. *Fruit* a many seeded capsule or a 1-seeded nut. *Seeds* albuminous ; embryo minute.

A family of practically no forest importance.

Fruit a many-seeded capsule :—

Both outer petals spurred. ...

Only one outer petal spurred. ...

Fruit a 1-seeded nut :—

Only one outer petal spurred. ...

1. *Dicentra*.

2. *Corydalis*.

3. *Fumaria*.

1. DICENTRA, Borkh.

Slender climbing glabrous herbs. *Leaves* decompoundly divided the rachis ending in much-divided slender tendrils. *Flowers* yellow often tinged with purple, in leaf-opposed racemes. *Sepals* small, scale-like, deciduous. *Petals* 4, connivent, the 2 outer saccate at the base, the inner clawed, keeled, cohering by

the tips. *Capsule* dehiscent by valves; seeds beaked, generally arillate.

Capsule upto 3 in. in length, slender torulose, dry.

Seeds in one row, arillate and granulate.

Capsule within 2 in. in length, continuous, tapering.

dry, Seeds in 2 rows, arillate.

Capsule less than 1 in. in length, ovate cordate

fleshy. Seeds in many rows, granulate.

... 1. *D. torulosa*.

... 2. *D. Roylei*.

... 3. *D. thalictrifolia*.

1. *Dicentra torulosa*, Hk. f. & Th.

A trailing plant with white sulcate stem. *Leaves* 2-4 in. long; leaflets 2-1.2 in. long, ovate obovate or elliptic, membranous. *Racemes* 6-8 flowered, sub-umbellate; peduncle 4-1 in. long. *Flowers* golden-yellow, 5-7 in. long, cylindrical; pedicels 4-7 in. long; bracts as long as the pedicels or sometimes shorter, fimbriate. *Capsule* 1-3 in. by 12-15 in., pod-like, torulose, 4-12-seeded. *Seeds* in one row, brownish, with a 2-lobed aril.

KHASI HILLS. 4-6,000 ft.

Fls. 7-8. Fr. 9-11.

2. *Dicentra Roylei*, Hk. f. & Th.

Closely resembling the preceding species in foliage and general appearance, but is smaller and more slender. *Flowers* somewhat larger, yellow, often tinged with purple. *Capsule* 1-2 by 15-2 in., tapering to a fine point, continuous; seeds close, in 2 rows, orbicular, compressed, with a small aril at the back.

KHASI HILLS. Griffith.

Fls. & Fr. 6-9.

3. *Dicentra thalictrifolia* Hk. f. & Th.

A more diffuse plant than the other 2 species, with the same general appearance, but the leaflets sometimes attain 1.5 in. in length and 1 in. in breadth. *Flowers* generally shorter and more stout, yellow or purple; pedicels filiform up to 1 in. in length, ovate or elliptic in outline. *Capsule* 5-7 by 3-4 in., more or less fleshy, tardily dehiscent, surmounted with the persistent style and stigma. *Seeds* in 4 rows, black when fully mature, shining, coarsely granulate on the back, often with a very small, white aril.

KHASI HILLS, Kalapani, 5,000 ft. Hk. f. & Th. Nongkrem, Collett.

Fls. 5-6. Fr. 10-12.

2. CORYDALIS, DC.

Corydalis sibirica, Pers.

A much branched perennial leafy prostrate plant of pasture lands: *Leaves* pinnately lobed, the uppermost usually with 3 obovate or oblanceolate segments, membranous. *Racemes* few-flowered, terminal; bracts small, lobed. *Sepals* 2, small. *Petals* yellow, tinged with purple; spur broad, obtuse; back petal hooded, acute. *Stamens* 6, 2-adelphous, the posterior bundle spurred. *Ovary* 1-celled; style short, filiform; stigmas 2. *Capsule* 3-6

in. long, narrowed to the pedicel and surmounted by the persistent style and stigmas. *Seeds* few, small, shining.

KHASI HILLS 5,000 ft. *Mann*.

Fls. 5-8. Fr. 8-10.

3. FUMARIA, Linn.

Fumaria parviflora, Lamk. Vern. *Bansula*, Beng.

A much-branched fodder plant 12-18 in. high with sharply angled whitish stem. *Leaves* 1-2 in. long, much divided; ultimate segments very narrow, glaucous. *Racemes* leaf-opposed, lax-flowered. 8-2 in. long. *Flowers* about .25 in. long, white or purple. *Sepals* 2, small. Only 1 outer petal spurred. *Fruit* a 1-seeded globose nut about .07 in. diam.

Rice fields in LOWER ASSAM; also SYLHET and CACHAR. Goes up to 4,000 ft. in the KHASI HILLS.

Fl. & Fr. 10-2.

FAM. 10 CRUCIFERÆ.

Herbs with watery juice which is often pungent. *Leaves* alternate, exstipulate, simple or pinnate, entire or variously lobed or ent. *Flowers* regular, usually racemed. *Sepals* 4, free imbricate, often saccate at the base. *Petals* 4, free, hypogynous, often opposite the sepals, placed crosswise, (whence the name of the family), imbricate. *Stamens* usually 6, tetradynamous; 2 outer opposite the lateral sepals; 4 inner longer, in pairs opposite the median sepals. *Disk* usually with 4 glands opposite the sepals. *Ovary* usually divided into 2 cells by a membranous partition (replum) or less often 1 celled or more rarely with transverse partitions; style short or 0; ovules few or many on two parietal placentas, rarely solitary erect. *Fruit* either elongated and pod-like siliqua, valves opening from the base and deciduous; or short and dehiscent or indehiscent. *Seeds* exalbuminous. *Cotyledons* large, foliaceous in germination.

This family contains several plants of considerable economic value but is of little importance for the Forester. The following is a brief account of the commoner plants found in Assam.

Fruit dehiscent:—

Flowers yellow. Sepals gibbous at the base. Siliqua terete, beaked:—

Siliqua long; seeds in one series.

Siliqua short, turgid; seeds in 2 series.

.. 1. *Brassica*.

.. 2. *Eruca*.

Flowers yellow or white. Sepals not gibbous at the base

Sepals spreading. Siliquas turgid.

Sepals erect. Siliquas flat, linear.

Flowers white. Siliquas compressed, oblong.

.. 3. *Nasturtium*.

.. 4. *Cardamine*.

.. 5. *Lepidium*.

Fruit indehiscent, terete, beaked, transversely septate:

Flowers white-tinged with light purple, large for the family. Lateral-sepals saccate at the base.

.. 6. *Raphanus*.

1. BRASSICA, Linn.

Fleshy herbs. *Leaves* large, pinnatifid or lyrate, rarely entire. *Flowers* yellow, rarely white, in long racemes. *Seplas* erect or spreading; lateral saccate or gibbous at the base. *Petals* with a long claw. *Siliquas* with a seedless indehiscent beak; replum membranous; seeds globose.

This genus includes a number of useful plants such as:—

The cabbage *Brassica oleracea*, L. Vern. *Band-kobi* and its varieties cauliflower, vern. phul-kobi and *Knolkhol* or vern. *Gantri-Kobi*, etc.

Cauline leaves amplexicaul, usually auricled at the base:—

Leaves more or less hairy and glaucous.	..	1. <i>B. campestris</i> .
Leaves quite glabrous, faintly glaucous beneath.	..	2. <i>B. napus</i> .
Cauline leaves not amplexicaul, narrowed to the naked petiole.	..	3. <i>B. juncea</i> .

1. *Brassica campestris*, Linn.

A stout erect herb often with a swollen tap-root; lower leaves lyrate, hairy or harsh; upper oblong or lanceolate, covered with bloom. *Siliquas* with a flat seedless beak.

Var. *Sarson*. Prain, the *Swet-sarisha* or *Swet-rai* of Bengal.

Fls. & Fr. in the plains cold season. In the hills about 5 months later.

2. *Brassica napus*, Linn. Var. *dichotoma*, Prain. The Indian mustard. Vern. *Sula-rai*, Beng.

A slender glabrous plant. *Radical* and lower *cauline* leaves pinnatifid, rather small. *Flowers* 4-5 in. diam., pale golden yellow. *Siliquas* 1.5-2 in. long including the beak which is 5-7 in. long, on pedicels 6-7.5 in. long, each containing 8-15 pale yellow or purplish-black globose seeds.

Much cultivated for the seed. The flowers and leaves are also eaten cooked.

Fls. 11-12, Fr. 1-8.

3. *Brassica juncea*, Hk. f. & Th. Vern. *Rai*. Beng.: *La* or *Lahi*. Ass.; *Mustard*, Eng.

Stout or slender according to the extent of cultivation given. *Leaves* long-petioled, not amplexicaul, often with small lateral leaflets or auricles along the petiole, glabrous or with scattered soft white hairs, or scabrous. *Flowers* bright yellow; pedicels and calyx spreading. *Siliquas* vertically compressed; beak short, acuminate. *Seeds* dark-brown, reticulate.

Cultivated both as a pot-herb and for its seeds throughout Assam.

Fls. 9-11. Fr. 11-1.

2. ERUCA, Tourn.

Eruca Sativa, Lamk. Syn. *Brassica eruroides*, Roxb. Vern. *Swet-sarisha*, *Taramani*, Beng.; *Horio* or *Horiho*, *Behuri*, Ass.

A slender herb resembling the mustard with more or less glabrescent stem. *Leaves* 1.5-7 in. long, irregularly pinnatifid;

segments linear-oblong. *Flowers* white or lilac ; '7-9 in. long, pedicels short, slender. *Sepals* erect slender, '4-5 in. long, veined. *Siliquas* erect and appressed to the stem, about '7-9 in. long with a flattened seedless beak. *Seeds* globose, in 2 series.

Cultivated in the BRAHMAPUTRA VALLEY for the seed.

Fls. & Fr. 1-3.

3. NASTURTIUM. Br.

Terrestrial or aquatic herbs. *Leaves* entire, lobed or pinnatifid, glabrous or hairy. *Flowers* yellow or white, racemose. *Sepals* short, spreading, not sacate at the base. *Petals* short, scarcely clawed, sometimes wanting. *Stamens* 1-3 pairs. *Siliquas* long or short, cylindrical ; septum transparent. *Seeds* small, generally in 2 series.

An erect terrestrial herb, often with unbranched stems.

Leaves pinnatifid. Flowers yellow.

.. 1. *N. indicum*.

A prostrate aquatic herb with much-branched stems.

Leaves pinnate. Flowers white.

.. 2. *N. officinale*

1. *Nasturtium indicum*, D C.

An annual weed about a foot long, usually hairy ; stem simple or branching from near the base. *Leaves* 2-5 in. long, variously lobed or divided, coarsely toothed, rarely simple. *Racemes* 1-4 in. long. *Flowers* small ; *sepals* and *petals* equal. *Siliquas* '5-1 in. long, linear or narrowly oblong, spreading, or ascending ; pedicels '1-25 in. long. *Seeds* numerous in 2 series, very small.

Var. *benghalense*, DC. which differs by having bracteate flowers and usually taller stems appears to be more common than the type in SURMA VALLEY and LOWER ASSAM.

Fls. and Fr. 3-5.

2. *Nasturtium officinale*, Br. *The Watercress*, Eng. Vern. *Ayrsch-um*, Kh.

A much-branched perennial aquatic plant growing on wet mud or sluggish water. *Leaves* pinnate or 2-pinnate ; leaflets and pinnules opposite with a terminal one which is usually by far the largest. *Racemes* 1-4 in. long, rather lax-flowered. *Flowers* white, very small. *Petals* 2 or 3 times longer than the sepals, veined. *Siliquas* '3-1 in. long, on slender pedicels '3-7 in. long. *Seeds* small, in 2 series.

The plant is much used as a vegetable, being eaten raw or cooked, and is often cultivated in gardens for that purpose.

Fls. and Fr. 4-11.

4. CARDAMINE, Linn.

Cardamine hirsuta, Linn. Var. *sylvatica*. Linn. Syn. *C. debilis*, Don.

A small suberect glabrous plant 3-9 in. long. *Leaves* 2-3 in. long, pinnate, sometimes pinnatisect ; *Leaflets* or *segments* '2-8 in. long, varying in shape from orbicular to ovate or elliptic, quite

glabrous, often dentate or lobulate. *Flowers* small, white in terminal racemes. *Sepals* very small, erect. *Petals* about twice as long as the sepals, erect, clawed. *Siliques* 5-1 in. long, ascending, linear, compressed, not beaked. *Seeds* 1-seriate.

Fls. 2-4. Fr. 6-7.

5. LEPIDIUM, Linn.

Lepidium sativum, Linn. The *Common cress*, Eng. Vern. *Halim*, Hind. & Beng.

A glabrous annual plant 1-3 ft. high. *Radical leaves* long-petioled, 1-2 pinnate or pinnatisect, upper pinnatifid or lobed with the petiole gradually diminishing in length and the blades in width. *Flowers* white, ebracteate, in terminal elongating racemes; sepals short, equal at the base. *Siliques* 16-25 in. long orbicular, compressed, notched at the apex; pedicels erect, slender. *Seeds* solitary in each cell.

Cultivated in gardens at Shillong. The leaves and tender shoots are said to be good for liver complaints, being eaten raw or as a pot-herb.

Fls. and Fr. 11-1.

6. RAPHANUS, Linn.

Raphanus sativus, Linn. The *Radish*, Eng. Vern. *Mula* or *Muli*, Hind., Beng., etc.

An annual or biennial plant with generally a spindle-shaped white or red, fleshy taproot which is pungent in taste. *Basal leaves* 9-18 in. long, lyrate pinnate or pinnatisect, hispid: leaflets or segments coarsely toothed; *cauline leaves* simple linear. *Flowers* usually white or lilac with purple veins, in long terminal ebracteate racemes. *Sepals* erect, lateral ones saccate at the base. *Siliques* indehiscent, elongate, terete, usually 1-2 in. long, with a long tapering beak, filled inside with white pith between the seeds. *Seeds* 2-8, globose pendulous.

The root as well as the young leaves and tender siliques are eaten, raw or cooked, for which the plant is cultivated as a field-crop throughout India.

Fls. & Fr. 12-2.

FAM. 11. CAPPARIDACEÆ.

Trees, erect or climbing shrubs or herbs. *Leaves* simple or palmately 3-9 foliolate; stipules often spinescent or wanting. *Flowers* 4-merous, solitary or in racemes, corymbs or umbels. *Sepals* 4, free or connate. *Petals* usually 4, sometimes 2 or 0. *Stamens* 4 or numerous, exserted, generally inserted at the base of a gynophore; filaments filiform. *Ovary* 1-celled, (stalked in all woody genera); style short or 0, generally solitary. *Fruit* berried (woody genera), or capsular; seeds exalbuminous.

- I. ERECT HERBS with linear or oblong capsular fruit :—
 - Gonophore 0. Petals open in bud. Stamens 4 to 8 inserted on the disk. ... 1. **Cleome**.
 - Gonophore present. Petals imbricate in bud. Stamens 6 on long filaments. ... 2. **Gynandropsis**.
- II. TREES OR SHRUBS, the latter sometimes scandent.
 - Fruit a berry, sometimes drupe like :—
 - A. Fruit many-seeded :—
 - Sepals 4, open in bud, adnate to the disk. Stamens 4-6, inserted high on the gynophore. Leaves 3-foliate. ... 3. **Cratæva**.
 - Sepals 4, closed in bud, free. Stamens 8-indefinite, inserted at the base of the gynophore. Leaves simple. ... 4 **Capparis**
 - Fruit 1-seeded. Calyx of six 2-seriate segments. Stamens indefinite, inserted above the base of the short gynophore. Leaves simple. ... 5. **Roydsia**.

1. CLEOME, Linn.

• **Cleome viscosa**, Linn. Vern. *Hurhuria*, Beng.

An erect annual weed, 1-3 ft. high, stem striated and tomentose with mixed simple and glandular hairs. *Leaves* 3-5-foliate, very variable in size; leaflets 3-1·5 by 2·8 in., obovate, membranous, sessile, sometimes confluent, more or less hairy; petioles 0-2 in., striated and hairy like the stem. *Flowers* yellow 5-6 in. long. in leaf-bearing terminal racemes; sepals 4, spreading; petals 4, veined, imbricate in bud. *Stamens* 4-8, inserted on the disk. *Ovary* sessile. *Capsule* 2-3 in. long, narrowed at both ends, striated, the straitions frequently anastomosing. *Seeds* about 0·4-8 in. diam., reniform, rugose, dark brown, oily.

Common in abandoned fields, and on old ruins in the plains of ASSAM and BENGAL; goes up to 2,000 ft. in the hills.

The seeds are used medicinally as carminative, anthelmintic and stimulant.

Fls. & fr. throughout the year, but chiefly during the rains.

2. GYNANDROPSIS, DC.

Gynandropsis 'pentaphylla, DC. Vern. *Sada-hurhuria*, Beng. ; *Hulhulia*, Hind.

Very similar to the above but is generally taller and more showy when in flower ; strongly smelling. *Petiole* 2-3·5 in. long. *Leaflets* sessile, usually 5, 5-1·5 by 3-1 in., the middle one being the largest. *Flowers* white or purple, in corymbiform terminal racemes ; pedicels filiform in flowers but stout in fruit ; bracts 3-foliate. *Stamens* 6, inserted on a gonophore ; anthers purple. *Ovary* stalked. *Capsule* 2-4 in. long by 2 in. diam. on a stalk longer than the pedicel. *Seeds* reniform, rugose brown or black.

As common as *C. viscosa*.

Fls. & Fr. Chiefly 7-9.

3. CRATÆVA, Linn.

Deciduous trees. *Leaves* palmately 3-foliate glabrous, bitter. *Flowers* large, white or pale-yellow. *Sepals* 4, adherent at the base to the fleshy lobed disk. *Petals* 4, long-clawed, open in bud. *Stamens* numerous on a short column at the base of the gynophore. *Ovary* 1-celled, on slender gynophore ; ovules many on two parietal placentas. Berry fleshy, many-seeded.

A large tree. Leaves small membranous, pale beneath ; fruit globose, 1-celled ; seeds reniform, smooth.

1. *C. Roxburghii*.

Middle sized trees :—

Leaves of medium size, membranous, glaucous beneath ;

fruit ovoid, 2-celled ; seeds flat and angular.

2. *C. Nurvala*.

Leaves large, subcoriaceous glaucous beneath ; fruit

ellipsoid globose ; seeds spinose-tubercled on the back. 3. *C. lophosperma*

1. **Cratæva Roxburghii** R. Br., Syn. ('. religiosa, Forst. var. Roxburghii, F. B. I. i. 172. Vern. *Barun*, Ass. ; *Sabe-dotke*, Miri and Abor. ; *Jong-sia*, Garo.

(Often a large tree up to about a hundred feet in height and 9 ft. in girth ; branchlets with tips pointed upward, and generally irregularly angled, and dotted with elongated lenticels. Bark grey or greenish grey outside, plain but covered with lenticular warts, green underneath the thin corky layer ; inside white mottled with brown strands. *Leaflets* 2-3 by 1-1·5 in. ovate, elliptic or lanceolate, the lateral oblique at base, abruptly acuminate, membranous, generally shining above, pale beneath ; lateral nerves 7-9 on either side of the midrib ; tertiaries laxly, and quaternaries very minutely and finely reticulate ; common petiole 1·7-4 in., petiolules about 2 in. long. *Flowers* white fading to pale yellow, appearing with, or immediately after the leaves, 1·5-2 in. across, open in buds in terminal corymbs 2-4 in. long ; pedicels slender 1·5 in. long. *Sepals* 2-3 in. long, linear or narrow-lanceolate, strongly keeled and finely acuminate. *Petals* 6-8 in. long, boardly ovate or rhomboid, with a distinct midrib

and side-nerves, narrowed to a claw 2-3 in. long. *Filaments* filiform, 1.5 in. long, purple; anthers oblong. *Gynophore* 1-2 in. long, slender; ovary oblong or ellipsoid; stigma sessile. *Fruit* 1.5-2 in. across globose, speckled with round white lenticels stalked by the much thickened gynophore; seeds about .5 by .3-.4 in., reniform, with a smooth, hard, dark-brown testa.

Common near Bomjur, Nizam-ghat, and along the Buri-suti, Janai and Dhikari streams, etc. in the N. E. FRONTIER DISTRICT, North Lakhimpur Sub-Division: also KAMRUP and GARO HILLS.

The wood is pale-white fine and even grained and is suitable for packing cases, toys, models, writing-boards, turnery, etc. The leaves are good for fodder.

Fls. 3-4. Fr. 11-1.

2. *Cratæva Nurvala*, Ham. Vern. *Barun* or *Borun* Ass.; *Mibonju*, Kach.; *Ngasentur*, Kuki.

A middle-sized tree up to 50 ft. in height and 4 ft. in girth. *Bark* ashy-grey with close horizontal wrinkles, otherwise smooth, .7 in. thick, inside granular, light reddish-brown (on very old trees). *Leaflets* not very bitter, 5-7 by 1.5-2.3 in., lanceolate, very gradually tapering from below the middle to a long acumen, also downward to a cuneate, and in the case of the lateral leaflets, an oblique base, chartaceous when fully mature; lateral nerves 8-15 on either side of the midrib, arched, the intervening spaces very finely reticulate; petiolules .1-.2 in., common petiole 3-5 in. long. *Flowers* practically as in the preceding species, but the sepals are not keeled and less persistent and the corymbs are more laxly flowered. *Fruit* oblong (mature not seen), 2-celled; seeds flat, closely packed.

Somewhat rare occurring sporadically on low hilly grounds, e.g., round Lumding, NOWGONG DISTRICT; at Boduti, North Lakhimpur, also Langting reserve and Daotuhaja, N. C. HILLS.

Fls. 4.5. 10-12 (?).

3. *Cratæva lophosperma*, Kurz. Vern. *Barun* or *Borun*, Ass. and Beng.; *Bonhukha*, Kach.; *Loi-emba-lei*, Manip.; *Senatur*, Lush.

A small or middle-sized tree generally found along edges of sluggish streams. *Bark* plain, dark ashy-grey marked with numerous lenticels on branchlets, pale-white and granular inside, .5 in. thick. *Leaflets* very bitter 5-8 by 1.5-3 in., lanceolate, tapering to a fine acumen from after a quarter of the length, lateral very oblique at base, subcoriaceous when mature, green and shining above, glaucous beneath; midrib strong, reddish; lateral nerves more numerous (often up to 30 on either half) and stronger than in the other two species, reddish, often nearly horizontal near the midrib, reticulations also stronger; petiolules .1-.2 in., common petiole 1.5-4 in. long. *Flowers* as in the

foregoing species, but the corymbs are often larger and more congested, the pedicels longer, up to 2·5 in., and the lanceolate sepals only faintly keeled. *Petals* white, turning yellow, obovate or rhomboid. *Filaments* about 2 in. long, purple. *Gynophore* 2-2·5 in. long. *Fruit* obovoid, elliptic, or globose, speckled, otherwise fairly smooth, 2-celled by the intrusion of the placentas. *Seeds* about 5 in. long, crescent-shaped, spinous tubercled on the back.

The commonest species of the genus occurs in all DISTRICTS of UPPER ASSAM, Burisuti, Dikhumukh, the Majuli, Gotonga, etc.

Fls. 3-4. Fr. 7-9.

4. CAPPARIS, Linn.

Erect or climbing shrubs or small trees. *Leaves* simple, usually with stipulary thorns. *Flowers* usually showy. *Sepals* 4 in 2 series, imbricate. *Petals* 4, imbricate, not clawed. *Stamens* indefinite; filaments long. *Ovary* on a long gynophore, generally 2-celled; ovules many on perietal placentas. *Fruit* berried; seeds many, cotyledons convolute.

I. Flowers in paniced umbels or corymbs :—

- | | | |
|---|----|-------------------------|
| Young shoots puberulous. Leaves glabrous, nerves inconspicuous. | .. | 1. <i>C. pumila</i> . |
| Young shoots glabrous. Leaves glabrous, nerves prominent beneath. | .. | 2. <i>C. assamica</i> . |

II. Flowers in vertical series :—

A. Series of flowers many, 2-4-stichous, usually independent of leaves, many flowered :—

- | | | |
|--|----|---------------------------|
| Young shoots glabrous, Fls. 2 in. across; fr. 3 in. across, | .. | 3. <i>C. multiflora</i> , |
| Young shoots scurfy. Flrs. 1-2 in. across; fr. 1-1·5 in. across. | .. | 4. <i>C. florrida</i> . |

B. Series of flowers axillary 1-few-flowered :—

1. Usually climbers, always armed, Leaves bluntly acuminate :—

- | | | |
|---|----|--------------------------|
| Branchlets brown-pubescent, Leaves subcoriaceous, Flowers large, Fruit beaked. Pedicels fairly stout. | .. | 5. <i>C. oiaefolia</i> . |
| Branchlets glabrous, Leaves membranous, Flowers small, Fruit not beaked. pedicels filiform. | .. | 6. <i>C. tenera</i> . |

2. Erect shrubs, usually not armed. Leaves taper pointed :—

- | | | |
|--|----|----------------------------|
| Leaves ovate or oblong lanceolate 2-4 in. long. Flowers usually not more than 2 in each series, Fruit the size of a pea. 2-seeded. | .. | 7. <i>C. sabiaefolia</i> . |
| Leaves elliptic, 3-6 in. long, Flowers often up to 4 in each series. Fruit 5 in. diam., many-seeded. | .. | 8. <i>C. viminea</i> . |

1. *Capparis pumila*, Champion.

A shrub with straggling branches, branchlets softly greenish-grey puberulous; prickles small, recurved. Leaves 2.3-5 by 1.2 in., elliptic or oblong-lanceolate, acuminate, subcoriaceous, glabrous; lateral nerves 6-7 on either half, extremely fine, almost invisible in green leaves; base subacute; petiole 1.5-2 in. long, channelled, puberulous. Flowers white, 5 in. diam., in corymbs or umbels arranged in terminal panicles; buds globose; pedicels 1.5-2.5 in. long. Petals oblong. Stamens about 20. Fruit 5-7 in. diam., 1-seeded, globose, glabrous; embryo curved.

Mikir Hills near Barapather. SIBSAGAR DISTRICT. Appears to be rare

2. *Capparis assamica*, Hk. f. & Th. (?) Vern. *Diengsu-sohsaw*. Khasi; *Thanim-nium-kra*, Duff.

A scandent (?) shrub with glabrous branches, innovations pubescent. Leaves 5-8 by 1.2-3 in., oblong-lanceolate acuminate, base acute, attenuate or cuneate, subcoriaceous, glabrous, lateral nerves prominent beneath, 9-13 on either half, arched and looping at the extremities; petiole 2-3 in. long, channelled, stipular prickles minute, straight. Inflorescence terminal or subterminal raceme-like, 6-11 in. long, bearing numerous small white flowers; rachis glabrescent; bracts subulate up to 1.5 in. pubescent when young, those at the base of the inflorescence empty; pedicels in several rows, very slender 4-7.5 in. long, 1 or 2 superposed and slightly supra-axillary on the bracts. Sepals imbricate in pairs 1.5-2 in. long, subequal, concave elliptic to oblong-elliptic. Petals white 2-2.5 in. long, white obovate oblong. Filaments filiform; gynophore 4-6 in. long. Fruit not seen.

Nongrang-koh, KHASI HILLS (My sheet 7248)

Firs. 4-5.

Our plant differs in many respects from *C. assamica* as described in F. B. I. by Hooker & Thomson.

It should be studied further with more complete materials

3. *Capparis multiflora*, Hk. f. & Th. Vern. *Thanim-nium-kre*, Aka; *Thanim-nium-kra*, Daff.

A very variable erect bush 8-15 ft. high, generally sparingly branched, branchlets glabrous, terete or angled, with a large pith; thorns short, thick, straight or up-curved. Leaves membranous, glabrous, acuminate, of two different sizes and shapes; those below the flowers 6-10 by 2.5-6 by 1.2-2 in., elliptic, oblanceolate, or lanceolate, somewhat more membranous; lateral nerves 6-8 on either half, depressed above, much curved, looped to form an intermarginal vein. Flowers white, 2 in. across, very sweet-scented, in many flowered vertical series which are close or somewhat distinct and 2-4-stichous; buds about 1 in. across, globose; pedicels filiform 5-7 in. long. Sepals 4, imbricate, ovate, glabrous or sparsely adpressed pubescent outside. Petals 4, broadly elliptic

or suborbicular, glabrous. *Stamens* about 12, filaments filiform. *Gynophore* of barren flowers 2-3 in. long, filiform straight; of fertile flowers about 1 in. long, much thicker, spirally twisted. *Fruit* globose, about 3-in. diam., glabrous.

Kalioni, Daigurung and Garampani, DISTRICT SIBSAGAR; Bhoroli Reserve and Dulongmukh, NORTH LAKHIMPUR; Bhalukpong, DARRANG.

Fls. 3-4. Fr. 12-2.

4. *Capparis horrida*, Linn. f. *Hunkara*, Sans; *Asaria*, *bagnai*, Beng.

A scandent or scrambling bush with greyish or pale brown somewhat rough bark; branchlets green, young parts covered with scurfy rusty, deciduous, tomentum. *Leaves* 2-4 in. by 1-2 in., lanceolate or elliptic ovate, acute or shortly acuminate, mucronate, base more or less rounded; lateral nerves 6-8 on either half, ascending, somewhat distant, forming loops at the extremity; petiole 25-4 in., more or less tomentose at least when young; stipular spines stout hooked with a yellowish-brown tip and broad base. *Flowers* usually superposed in extra-axillary, rows 1-4 together, white, turning pink 1-2 in. across; pedicels 5-1 in. long. *Sepals* concave scurfy. *Petals* oblong obovate, exceeding the sepals, villous inside. *Stamens* numerous, purple, slender, up to 15 in. long; gynophore up to 17 in. enlarging and becoming woody in fruit. *Berry* 1-15 in. across, broadly ellipsoid or ovoid, orange red when ripe.

GARO HILLS—12th mile—Dalu road.

Flrs. 3-4. Fr. 8-9.

5. *Capparis olacifolia*, Hk. f. & Th. Vern. *kota-har*, Ass; *Ingau-rikang*, *Ingau-waikom*, Mik.; *Borun-khosai*, *Borun-phita-phang* Kach.; *Ling-uom*, Kuki *Deing-sia*, Khasi; *Ganga-thaisip*, Mech.

An erect shrub up to 15 ft. in height and 6-9 in. girth with blackish-grey, corky or warty bark and spreading branches; young shoots dark-brown, pubescent, terete, thorns usually straight and pointing upward. *Leaves* 2-6 by 8-25 in., ovate-lanceolate, taper-pointed, chartaceous or thinly coriaceous, glabrous except that the midrib is sometimes pubescent in very young leaves, shining above; lateral nerves 7-8 on either side of the midrib, arched, rather prominent underneath; base rounded or subacute; petiole 2-3 in. long, puberulous in young leaves. *Flowers* solitary or two from the same leaf-axil, white, inodorous, 15 in. diam.; buds ovoid, glabrous; pedicels 3-5 in. long. *Sepals* lanceolate, ciliate with dense tomentum. *Petals* obovate-oblong or oblanceolate, pubescent, white, the lowest with pale-yellow or purple blotch. *Stamens* about 35; filaments 1-13 in. long, anthers white at first with purple veins, turning blue in fading. *Ovary* pubescent. *Gynophore* 1-15

in. long, gradually thickened towards the apex in fruit. *Berries* '3-6 in. across, globose or ellipsoid and with a stiff conical beak, red when ripe, insipid, glabrous but rugose shifting; seeds 1-3 about '2 in. across, globose, reddish-brown; cotyledons convolute.

Nizamghat. N. E. FRONTIER: from Barpathar westward in SIBSAGAR and NOWGONG DISTRICTS: Bhounraguri near Tezpur: DARRANG; Kuls plantation, Andheri-juli, Luri, KAMRUP; Langting, Mupa, N. CACHAR; Shella, KHASI HILLS. Frequent in Sal and other deciduous forests.

Fls. 3-4. Fr. 12-2.

6. *Capparis tenera*, Dalz. Vern. *Premjila-khosa*, Kach.

A straggling glabrous climber; thorns recurved, whitish, very sharp-pointed, in pairs at the base of each leaf. *Leaves* 1-5-3 by '8-1-7 in., ovate, elliptic or lanceolate, finely acuminate, generally rounded at base, membranous, glabrous; lateral nerves 4-5 on either side of the midrib, much arched, very faint; petiole '2-3 in. long, slender. *Flowers* white, 2-5 from each axillary series, '3-4 in. across; buds globose, glabrous; pedicels '7-1-3 in. long, very slender. *Sepals* '12-15 in. long broadly elliptic or ovate, densely tomentose along the edges. *Petals* '2-3 in. long, oblong, woolly on both surfaces. *Stamens* 6-15; filaments very slender '6-9 in. long; anthers minute with a crooked tip. *Ovary* red, glabrous. *Gynophore* about as long as pedicel. *Fruit* pisiform, few seeded.

Diphu, Rengma and Nambor Reserves, SIBSAGAR: Dimapur, NOWGONG District; MANIPUR, Watt.

Fls. 3-4. Fr. 7-9.

7. *Capparis sabiaefolia*, Hk. f. & Th.

An erect shrub with thin glabrous branches; thorns 0, or minute increasing in size with age, conical, ascending. *Leaves* 2-4 by '7-1-5 in., elliptic to oblong-lanceolate, long-acuminate, subacute, rarely rounded at the base, thinly chartaceous, glabrous; main lateral nerves about 8 on either half, slender, arched; petiole '2-3 in. long, channelled. *Flowers* white, '2-6 in. across, usually 2 in each series, often solitary, slender, pedicels '5-6 in. in flower, lengthening (including the slender gynophore) to 2-2-2 in. in fruit. *Sepals* about '2 in. long, broadly abovate, glabrous except along the margins which are furfurous. *Fruit* about '2 in. in diam., globose.

Appears to be common in the NAGA HILLS *King ! Prain ! Watts !* and between 4-6,000 ft. in the KHASI HILLS, Shillong. *Hk. f. & Th.*

Fls. 4-6. Fr. 8-10.

8. *Capparis viminea*, Hk. f. & Th.

A glabrous bushy shrub 6-8 ft. high; stem and branches whitish. *Leaves* 2-5-6 by 1-2 in., ovate or elliptic, abruptly

long-acuminate, more or less acute at the base, membranous, glabrous: main lateral nerves 3-5, often with a few intermediate ones, much arched; petiole 2-3 in. long, rather stout, finely channelled. *Flowers* about 5 in. across, 2-4 in each series, very channelled. *Flowers* about 5 in. across, 2-4 in each series, very rarely solitary. *Sepals* as in the last species or narrower. *Fruit* 5-6 in. across, globose, many seeded.

In scrubs in the KHASI and N. CACHAR HILLS between 1-5,000 ft.

Fls 4-5. Fr. 7-9.

5. ROYDSIA, Roxb.

Roydsia suaveolens. Roxb. *Madhmalati*, *Madhabimalati*, Ass. ; Maonl. Tipp ; *Tille-saphlit*. Synt.

A large unarmed woody climber with speckled branches. *Leaves* simple 5-12 by 2-5 in., oblong or oblong-lanceolate generally thickly coriaceous, glabrous, glossy, deep-green above, pale underneath, generally minutely punctulate, with raised white dots on both surfaces, quite entire; main lateral nerves about 10-12 on either side of the midrib with 1-2 intermediate ones, the former looping to form an intermarginal nerve close to the edge, the intervening spaces strongly reticulate; base rounded or subacute; petiole 8-17 in. long, terete, rugulose. *Racemes* axillary, or slightly supra-axillary, generally simple and solitary, but sometimes forming a terminal panicle 3-7 in. long; rachis and pedicels velvety-pubescent especially when young. *Flowers* 4-6 in. long, and about as broad, dull-white, very sweet-scented (resembling *Mignonette*); pedicels 1-2 in. long; bracts subulate, tomentose about as long as the pedicels; buds obovoid-globose. *Calyx* 6-partite, segments in two rows, velvety, slightly imbricate in bud. *Petals* 0. *Stamens* numerous; filaments white fading to pale-yellow, 3-5 in. long, somewhat expanded in the middle. *Ovary* 3-celled; *styles* 3, about 68 in. long, subulate often slightly connate at base. *Gynophore* very short in flower enlarging to about 25 by 2 in. in fruit. *Fruit* a 1-seeded drupe, 1-1 in. long, ellipsoid or obovoid, scurfy, pale-orange when ripe; pulp yellow, aromatic, sweetish.

Fairly common throughout UPPER ASSAM. Quite worth cultivating for the delightfully-scented flowers.

The ripe fruit is eaten.

Fls 2-3. Fr. 10-1.

FAM. 12. VIOLACEÆ.

Herbs, shrubs or (rarely) small trees. *Leaves* alternate, rarely opposite, stipulate. *Flowers* regular or irregular, 2-bractenolate. *Sepals* 5, persistent, equal or unequal, imbricate in bud. *Petals* 5, hypogynous, the lower dissimilar, often saccate or spurred. *Stamens* 5, hypogynous or slightly perigynous; filaments short; anthers free or connate, with a broad overtopping connective, opening by longitudinal slits or terminal pores; staminodes 0. *Ovary* sessile, 1-celled; style 1, stigma entire or lobed; ovules many on parietal placentas. *Fruit* usually a 3-valved loculicidal capsule. *Seeds* small; cotyledons flat imbedded in a fleshy albumen.

Annual or perennial herbs. Sepals produced at the base

Corolla irregular; lowermost petal spurred
or saccate at the base. ...

1. *Viola*.

Shrubs or trees. Sepals rigid. Corolla regular; petals
subequal ...

2. *Alsodola*.

1. VIOLA, Linn.

Erect herbs, sometimes with a perennial woody root stock. *Flowers* sometimes cleistogamous and smaller than the ordinary ones, but producing more seeds. *Sepals* produced at the base. *Petals* erect or spreading, the lowest usually the largest, spurred or saccate. *Anthers* connate, the connectives of 2 lower often spurred at the base. *Stigma* obtuse, lobed or 4-lobular. *Capsule* 1-celled, 3-valved.

Stigma terminal, Capsule oblong or linear, many-seeded :—

Stemless and without stolon. Stipules adnate. Spur
saccate.

1. *V. Patrinii*.

Stemless but with stolon. Stipules free or nearly so.
Spur globose.

2. *V. diffusa*.

With long leafy stems and stolons. Stipules free. Spur
saccate.

3. *V. arcuata*.

Stigma lateral or oblique, Capsule globose, few-seeded :—

With long leafy stems and stolons. Stipules free. Spur
saccate.

4. *V. serpens*.

1. *Viola Patrinii*, DC.

Root stock perennial. *Leaves* glossy-green, very variable in shape and size, generally 1-3 in. by 3-1 in., more or less triangular in outline, crenate or serrate, cuneate or hastate at the base, generally glabrous, petiole about 3 times as long as the blade which is decurrent with it for some distance from above. *Flowers* lilac, scented, about 5 in. long, generally with smaller colourless flowers from the rootstock; peduncle of larger flowers 3-5 in., of the smaller flowers 6-8 in. long and more slender. *Spur* saccate, about 2 in. long.

KHASI HILLS; KAMRUP *Masters* ! ABOR HILLS, *Burkill* ! : MANIPUR, *Watt*.

Fls. 3-5.

2. *Viola diffusa*, Ging.

Stemless herb widely spreading by stolons. *Leaves* 5-2 by 3-8 in., globose obovate oblanceolate or spatulate, pubescent, crenate or crenulate, strongly ciliate along the margins; blade decurrent with the petiole throughout, which is 5-3 in. long. *Flowers* 3 in. across, dull-purple or nearly white, not scented; peduncle 5-2 in. long, slender, with a pair of linear bracts about the middle; petals recurved; style slender at the base, thickening upwards to the stigma. *Spur* globose.

KHASI HILLS - NORTH CACHAR HILLS, *Haflong*, *Craib* ! : NAGA HILLS, *Konoma*, *Watt* ! : ABOR HILLS, *Ponjijhams*, *Burkill* !

Fls. 2-3. Fr. 4-6.

3. *Viola arcuata*, Bl. (1825). Syn. *V. distans*, *Wall.*, (1828).

Stems slender, 2-9 in. long. *Stolons* slender often bearing leaves and flowers. *Leaves* 5-1.5 in. long, usually as broad as long sometimes broader than long, ovate deeply cordate or deltoid, more or less acute, crenate-serrate, glabrous or hirsute when mature; petiole 5-1.5 in. long, slender, glabrous. *Flowers* about 4 in. across, white or faintly blue; sepals acute; the lowermost petal sometimes smaller than the others; style straight, tapering to the stigma; peduncle 1.5-3 in. long, minutely bracteate usually above the middle. *Spur* saccate. *Capsule* about 4 in. long, many seeded.

KHASI HILLS above 4,000 ft., Shillong Mawphlong, Myrang, Cherrapunji, *et c.*

Fls. 4.5.

4. *Viola serpens*, Wall.

Very similar to the foregoing species and quite as variable. *Stem* and *stolon* sometimes absent. *Leaves* 5 by 4-2.5 in., ovate acute or acuminate, more or less deeply cordate with a narrow or broad sinus, crenate-serrate, glabrous or pubescent; *petiole* 2-4 in. long, slender; stipules toothed or fimbriate. *Flowers* 4-6 in. across, bluish or white, not scented; sepals about 1 in. long, acute, canescent; peduncles 2-5 in. long, bracteate about the middle or a little above it. *Spur* saccate, about 2 in. long. *Stigma* on an oblique or crooked, trumpet-shaped style. *Capsule* small, globose, few seeded.

KHASI HILLS; NAGA HILLS, *Prain* ! MANIPUR, *Watt* !

Fls. 2-4.

The following two garden species are frequently cultivated at Shillong and other hill stations—

5. *Viola tricolor*, Linn. *The Heartsease or garden pansy*. An annual herb. The flowers are up to 2 in. across and very showy.

6. *Viola odorata*, Linn. The 'Sweet violet'. A perennial herb. The flowers are of the shape of the indigenous violets and only slightly larger in size, but are very sweet-scented.

2. ALSODEIA, Thouars.

Shrubs or small trees. *Leaves* distichous, usually alternate stipules rigid. *Flowers* small, regular, axillary or terminal, solitary or in fascicles cymes or racemes. *Sepals* and *petals* 5 each, subequal; peduncles bracteate. *Stamens* 5, inserted inside or on an annular disk; connective produced into a broad membranous appendage. *Ovary* 1-celled with few or many ovules; style straight; stigma terminal. *Capsule* 3-valved, few-seeded; seeds glabrous.

Leaves small, scarcely exceeding 2 in. in length. Stamens exerted; anther cohering in a conc. Nerve-axils of leaves perforated.

Leaves middle-sized, at least 2.5 in. in length. Stamens included; anthers free:—

Nerve-axils of leaves bearded beneath. Flowers fascicled; peduncles 1-flowered. ... 1. *A. Roxburghii*.

Nerve-axils of leaves not bearded beneath. Flowers in axillary erect racemes. ... 2. *A. bengalensis*.

... 3. *A. racemosa*.

1. *Alsodeia Roxburghii*, Wall.

A small shrub with switchy, compressed and pubescent branchlets. *Leaves* 5-2 by 3-1 in. sessile, elliptic or lanceolate, cuneate at the base, acute or acuminate, entire or more or less crenulate, membranous or thinly chartaceous, glabrous above, usually pale and furfuraceous beneath; perforate at the axils of the lateral nerves which are about 4 on either half; tertiaries generally obsolete. *Flowers* white, axillary, subsessile, about 1 in. across; sepals unequal, obtuse; petals linear, tips revolute. *Disk* 10-toothed. *Stamens* exerted; filaments glabrous; anthers white, tomentose at the base; appendage oblong. *Ovary* glabrous; style slender, filiform. *Capsule* 2-3 in. long, pedicelled; tapering to the apex, 1-few-seeded.

Appears to have spread from Bengal into South Sylhet, Wallich's Distrib. BEHAR, BURMA and the ANDAMANS.

Fls. 9-10. Fr. 11-12.

2. *Alsodeia bengalensis*, Wall.

A large evergreen shrub or small tree often with channelled branchlets. *Leaves* 2.5-7 by 1.2-3 in., elliptic-lanceolate, serrate or serrulate, thinly chartaceous, wholly glabrous; bearded at the axils of the lateral nerves; main lateral nerves about a dozen on either half, slender, arched; tertiaries transverse to the lateral about .04 in. apart, subparallel; stipules .5 in. long, lanceolate. *Peduncle* in fascicles of 5-8, .3-.55 in. long, narrow-flowered, glabrous or pubescent. *Flowers* .15 in. across, glabrous. *Sepals* 5, about half the size of the flowers, broadly ovate, subacute, puberulous. *Petals* 5, ovate elliptic. *Disk* fleshy, 5-lobed. *Filaments* 5, very short, expanded at the base and cohering into a tube;

anthers oblong, glabrous, with a broad, hooded, sub-apical membranous appendage. *Style* short, simple. *Capsule* .25-.35 in. diam., globose, glabrous, 3-4 seeded. *Seeds* about .15 in. in diam., globose, brown-speckled.

SYLHET, Wallich and Griffith !

Fls. 2-4-10. Fr. 4-9-12.

3. *Alsodeia racemosa*, Hk. and Th.

A handsome glabrous shrub or small tree with rigid branches. *Leaves* 2-6 by 1-2.5 in., elliptic or obovate, acuminate, cuneate at the base, membranous, more or less repand serrulate, glabrous, shining above; main lateral nerves 7-11 on either half, slender, irregularly arched, with no perforations or beard at their axils; minor nerves reticulate; petiole .15-2 in. long, slender, puberulous; stipules as long as the petiole, subulate, scarious. *Racemes* 2-3 in. long, simple, erect or ascending, flower-bearing throughout their length, persistently bracteate; pedicels short, stiff, shortly 2-bracteolate at the base. *Flowers* .12 in. diam. *Sepals* ovate, about .08 in. long. *Petals* .1-1.2 in. long, oblong. *Filaments* subulate, glabrous, connate at the base and forming a cup with the disk; anthers ovate, hairy at the base, tip of connective broad, subacute. *Capsule* .5-6 in. long, glabrous; carpels boat shaped, strongly reticulate outside. *Seeds* .16 in. across, globose, white throughout.

ASSAM, Griffith ! But I have not found it anywhere in this Province

Fls. 3-4. Fr. 4-5.

13. BIXACEÆ.

(Warburg in Engler and Prantl's; *Pflanzenfamilien*; III. 6. 367).

Trees or shrubs with mucilaginous sap. *Leaves* simple, alternate, palminerved or palmately lobed; stipules minute, caducous. *Flowers* large, regular, 2-sexual. *Sepals* 4-5, free, imbricate. *Petals* 4-5, free, large. *Stamens* many; anthers 2 celled opening by slits or pores. *Ovary* 1-celled or spuriously 2-5 celled; ovules many, anatropous. *Fruit* a 1-5 celled dry capsule opening by valves. *Seeds* many, sometimes with long hairs; albumen copious; cotyledons foliaceous.

1. BIXA, Linn.

• *Bixa Orellana*, Linn. Vern. *Jarat*, *Jolandhar*, *hatronga*, Ass.; *Latkan*, Beng. The arnatto.

A small evergreen tree up to 15 ft., in height, generally with long branches from near the ground. *Bark* brown, fairly smooth.

Blaze yellowish brown turning reddish, fibrous; young parts and inflorescence with rust coloured scurfy tomentum. *Leaves* alternate 3-8 by 2-5 in., broadly ovate to cordate, tapering acuminate, entire or more or less sinuate on the margins, chartaceous or subcoriaceous, glabrous and somewhat shining above, undersurface usually with minute scurfy dots, nerves prominent beneath, main lateral nerves 4-5 on either side (excluding the basal) arcuate, prominent beneath, secondaries subparallel; base 5 nerved, truncate to shallow cordate, often more or less oblique; petiole 2-3 in. long, dilated at the apex; base more or less pulvinate; stipules very short, broad, early deciduous, stipular scar almost annulate with a circular gland close to and on either side of the petiole. *Flowers* white or pinkish, 1-2 in. across, in short terminal panicles about 2-5-3-5 in. across; pedicels .25-.35 in. long in flower, elongating to 5 in. in fruit, dilated upwards, apex with 5 persistent glands. *Bracts* and bracteoles very short broad, each often with a dorsal gland. *Sepals* 5, imbricate, deciduous. *Petals* 5, contorted in bud, oblong obovate about .6 in. long. *Stamens* numerous, inserted on a rather stout torus; filaments very slender about .4-.5 in. long; anthers opening by two terminal pores. *Ovary* 1-celled about .1 in. long, covered with soft bristles; style slender about .5 in. long, curved, dilated towards the top; stigma 2-cleft; ovules many on parietal placentas. *Capsule* 1.5-2 in. long, ovoid, densely but softly echinate, spines slender up to .3 in. long, subulate. *Seeds* many, in a farinaceous red pulp, obovoid, .2 in. long, albumen fleshy; cotyledons flat.

Introduced from Tropical America. e. g. near Nazira and many other places in SIBSAGAR DISTRICT, Lakhipur in CACHAR, SYLHET, Gomez! KHASI HILLS, 2500 ft., Clarke! MANIPUR, Watt! ASSAM, Jenkins! Masters!

The pulp surrounding the seeds is the well known arnatto or anatto dye, which is used, to colour butter, and other food and also silk to which it gives various shades of orange and red colours. It is also used for dyeing the hands. A strong fibre is obtained from the bark which is suitable for ropes. The seeds and root bark have also valuable medicinal properties.

Fls. 7-10. Fr. 10-12.

14. FLACOURTIACEÆ.

Trees or shrubs without mucilaginous sap. *Leaves* alternate, usually distichous, penninerved, rarely palminerved, often with translucent dots and dashes beneath; stipules small and caducous. *Flowers* bracteate, small, regular, 2-sexual or polygamous or dioecious, axillary or on lateral appendages of various shapes. *Sepals* 4-many, free, hypogynous or more or less perigynous, sometimes connate in bud. *Petals* 0, or 2-3 to several

times as many as the sepals. *Stamens* usually more numerous than the petals, in 1-many series, sometimes in bundles opposite the petals; anthers opening usually by lateral slits. *Ovary* superior, sometimes half-inferior, more rarely wholly so, 1-celled with 2-8 (usually 3-5) parietal placentas, which sometimes meet in the axis making the ovary spuriously as many celled; ovules usually many, anatropous; styles as many as the placentas, often connate. *Fruit* a capsule or a berry which is sometimes drupaceous. *Seeds* 1 or more, albuminous; cotyledons foliaceous (*partly after Haines' Botany of Behar and Orissa*).

Petals present :—

- | | |
|--|-----------------|
| Flowers in racemes, spikes or panicles. Fruit a dry capsule. | 1. Homaliūm. |
| Flowers in fascicles or cymes. Fruit a berry with a hard rind :— | |
| Stamens numerous (often up to 100 or more). | 2. Gynocardia. |
| Stamens not exceeding 20 (in the species here described). | 3. Hydnocarpus. |

Petals 0 :—

- | | |
|--|----------------|
| Fruit a succulent, sometimes drupaceous berry :— | |
| Ovary 2-8-celled with 2-6 styles. | 4. Flacourtia. |
| Ovary 1-celled with many connate styles. | 5. Xylosma. |
| Fruit a succulent capsule. Ovary 2-8 celled with 2-8 styles. | 6. Casearia. |

1. HOMALIUM, Jacq.

(Generally small tree. *Leaves* alternate, more or less crenate or serrate or entire, usually petioled, sometimes punctulate. *Flowers* small, hairy, in slender axillary or terminal, simple or paniced, racemes or spikes; bracts often prominent but caducous. *Calyx tube* adnate to the base of the ovary; segments 5-7, narrow, persistent. *Petals* 5-7, persistent. *Disk* tomentose. *Stamens* inserted at the base of the petals, solitary or in fascicles of 2-7, opposite the petals alternating with round hairy staminodal glands. *Ovary* half-superior, 1-celled; styles 2-6, filiform; stigmas capitate; ovules 2-many, pendulous on 2-6 parietal placentas at the top. *Capsule* half buried in the persistent calyx, coriaceous, 5 valved at the apex. *Seeds* usually few, albumen copious.

Racemes elongate. Stamens 1 opposite each petal. 1. *H. bhamoense* var. *Deb-barmani*.

Racemes paniced and divaricate. Stamens 3 opposite each petal. 2. *H. Schlicchii*

1. *Homaliūm bhamoense*, Cubit et Smith, var. *Debbarmani*. *Kanjilal*. f. Vern. *Shokshimaroug*, Garo.

A tall tree. Bark nearly smooth outside, blaze dun-brown; young parts, petiole and inflorescence, grey tomentose. *Leaves* 2-farious, 3-6 by 2-3.5 in. variable, elliptic-oblong or elliptic,

* I follow Warburg in Engler and Prantl's "Pflanzenfamilien" vol iii. 6A in uniting *Casearia* and *Homaliūm* with *Flacourtia*, *Xylosma*, *Gynocardia* and *Hydnocarpus* into one family and calling it FLACOURTIACEÆ.

somewhat bluntly acuminate, crenate serrate, sub-coriaceous, puberulous along the midrib and often along the nerves, otherwise glabrous above, softly hairy especially along the nerves beneath; main lateral nerves 7-10 on either side, tertiaries sub-parallel; base more or less cuneate, often decurrent into the channelled petiole which is .25-.5 in. long. *Flowers* small, in dense clusters on axillary racemes 3-8 in. long, which are sometimes branched; pedicels slender about .05 in. long. *Calyx* thinly pubescent outside, tube more or less ribbed, upto .07 in. long; lobes 5 or 4 about equalling the tube, linear, ciliate. *Petals* 5 or 4, .06-.1 in. long, spatulate or oblanceolate, ciliate. *Stamens* one opposite each petal and exceeding them in length. *Free* portion of ovary thinly pubescent; styles 4-3, sometimes 5. *Capsules* about .08 in. long.

GARO HILLS. Distribution BURMA: SIKKIM.

Fls. 3-4.

Typical *H. bhamoense*, Cubit and Smith, has, so far not been collected outside Burma. Our plant differs from it by its narrower, more softly pubescent leaves and somewhat larger flowers with less densely ciliate more elongate petals.

Forma glabra. Vern. *Sajira*, *Bolong*, Ass.; *Bolong-wah-vthri*; *Boldu-jag-teng*. Garo—differs from var. *Debbharmani*, by its glabrous or glabrescent and broader—usually elliptic to broadly elliptic leaves.

CACHAR—Lalchera: KAMRUP—KuIsi Range; GARO HILLS, Distribution CHITTAGONG.

It would appear that *H. bhamoense*, and the plants here described constitute a north eastern race of *H. zeylanicum*, Benth, and that they should all be combined with it under one species. Intermediate forms seem to occur and it is often difficult to differentiate between glabrous forms of *H. bhamoense* and *H. zeylanicum*.

2. *Homalium Schlichii*, Kurz. Vern. *Iheng-soh-mara*. Khasi.

A tall tree about 100 ft. in height and 7 ft. in girth buttressed at the base when old, deciduous in the hills but usually evergreen in shady localities in the plains. *Bark* dark-brown and somewhat rough outside, inside hard, granular, rich dun-brown mottled with specks of deeper colour, .5 in. thick. *Leaves* 3-7 by 1.5-2.4 in., elliptic, oblong or ovate, acute or cuneate at the base, shortly acuminate, distantly coarsely crenate or crenulate, subcoriaceous, glabrous, shining above, yellow before falling; lateral nerves 8-10 on either half, arched; petiole .3-.5 in. long, stout, red on young leaves as also are the midrib, nerves and margins. *Flowers* small, up to .2 in. across, on short divaricate terminal or subterminal grey pubescent panicles 2-4 in. long; pedicels short, but stout, thickly grey tomentose. *Sepals* linear-oblong, pubescent. *Petals* elliptic to oblanceolate, also pubescent but somewhat larger. *Stamens* 3 before each petal alternating with hairy gland like staminodes. *Free* portion of ovary tomentose.

KASHI HILLS, c. g., Nongkhla, Wah Rangphasaw, etc., also Badshaitila Reserve—SYLHET.

Fls. 3-5 Fr. not known.

2. GYNOCARDIA, R. Br.

Gynocardia odorata, R. Br. Vern. *Chaulmugra*, Beng. & Ass.; *Bon-sha*, Ass. (Darrang); *Bandarpelo*, Ass., *Lemtem*, Ass. (Sibsagar), *Dieng-soh-phailing*, *Soh-phoeing*, *Dierly-soh-lung*, Khasi; *Thebong-kok*, *Kampi-bumtal-arong*, Mik.; *Balibu*, *Masribu*, *Thithopha-bipha*, Garo; *Sibe-tulpi*, Abor; *Sibe-turpu*, Miri & Abor; *Tuki-sidik*, *Taki pomju-asing*, Miri; *Tak ik-changne*, or *Tuluk-changne*, Duff; *Umphu*, Aka; *Khungkha-biphang*, *Thailaokhiong*, *Thuila-phrong-buphang*, *athaiba*, (*athaiba* = fruit borne stem), Mech; *Thri-nong-pung*, Kuki; *Koutur*, Lushai & Kuki.

A small or middle sized glabrous tree with slender branches. Bark grey or greenish grey and generally warty outside, uniformly pale brown inside, 25-5 in. thick, green underneath the cuticle. Leaves bifarious, 6-10 by 1.5-3.5 in., oblong, abruptly acuminate, rounded or acute at base, entire, thinly coriaceous; lateral nerves 5-9 on either side of the midrib including the subbasal pair, very arcuate, tertiaries transverse to the midrib and often continuous from margin to margin. Quaternaries openly reticulate. Petiole 1-1.5 in. long, continuous, channelled. Flowers dioecious, pale-yellow, sweet scented, in few flowered axillary fascicles or in large bunches (of about 40 flowers) from the trunk, 1-1.5 in. across, female comparatively larger; buds globose, peduncles 1-2.5 in. long with minute bracts at the base. Calyx 5-lobed, saucer-shaped, leathery. Petals oblong or ovate, fleshy. MALE FLRS.—Stamens about 100; filaments wooly. FEMALE FLRS.—Stamnodes 10 or 15 villous, ovary 1-celled; styles 5. Fruit 3-5 in. across, always on the trunk, globose but usually broader than long, with a thick, hard rind minutely lenticelled outside. Seeds about 1 in. long, obovoid or oblong, circular in cross section; embryo somewhat eccentric, cotyledons about .05 in. thick, set in thick oily albumen.

Fairly common in evergreen forests throughout the province.

The seeds yield a somewhat thick brownish oil which is however less medicinal value than that of *Hydnocarpus Kurzii*.

Flrs 3-4 Fr. Cold season

Sir David Prain (Bengal Plants, p. 239) has revived Ruxburgh's name CHAULMOOGRAH for this Genus, but as this is not the real *Chaulmugra* tree, it is perhaps better to suppress that name.

3. HYDNOCARPUS, Gærtn.

Hydnocarpus Kurzii, Warb. Syn. *Taraktogenos Kurzii*, King; *Hydnocarpus heterophyllus*, Kurz. Vern. *Lamtem*, Ass.; *Chaulmugra*, *Dalmugri*, Beng.; *Dieng-soh-lap*, Khasi; *Thibongthar*, *Thehongthar*, Mik.; *Balibi*, Garo; *Kirta-Kirpang*, *Talo-asing*, Abor; *Siri-asing*, Miri; *Serbuli* or *Shauloukrongbupham*, Kach.; *Rowai-thing*, Naga; *Mata*, Kuki; *Matta*, Lusha. & Tipp; *Uthou*, Manip. *Bandie*, Nep.; *Dieng-soh-lap*, Khasi.

A tree up to 50 ft. in height with a tall trunk and narrow crown, with hanging branches. *Bark* fairly plain, grey, brown or almost black outside, often with white patches, uniformly yellow or yellowish brown and somewhat granular inside, .15-.25 in. thick; young parts tawny, pubescent. *Leaves* very much as in *Gynocardia odorata*, but the petiole is longer and swollen and slightly geniculate at the upper end, and the blade generally somewhat more thickly coriaceous and almost always cuneate at the base; lateral nerves more oblique and longer. *Flowers* .3-.5 in. across, pale yellow, inodorous, in few flowered axillary cymes, dioecious, though a few hermaphrodite flowers are sometimes found on male trees; pedicels up to .7 in. long. **MALE FLRS.**—*Sepals* 4, in pairs, round, concave. *Petals* 8, in two rows, smaller than the sepals, each with a cuneate, fleshy gland at the base. *Stamens* 20-30. **FEM. and 2-SEXUAL FLRS.**—much like the male, but *sepals* and *petals* often fewer, and stamens when present, not more than 16. *Ovary* villous, 1-celled; placentas 4, parietal. *Fruit* chocolate-brown, 3-2.5 in. across, globose, but generally rather longer than broad with a hard, plain but scurfy and rather velvety rind and a stout beak (the remains of the stigmas). *Seeds* about 1 in. long, faceted, tightly packed in the fruit; embryo central; cotyledons thin, broadly ovate, about .3 in. long and as broad, 2-nerved; albumen copious, oily.

Common in evergreen forests throughout UPPER ASSAM, often forming gregarious patches.

The seeds of this tree yield the proper Chaulmugra oil which is much used for all cutaneous complaints. Modern Systematists have dropped the generic name *Taraktogenos* and replaced this tree under *Hydnocarpus*.

Fr. 11.

4. FLACOURTIA, Commers.

Trees or shrubs, usually thorny; young shoots often reddish, *Leaves* toothed or crenate, penninerved with the lowest nerves basal or subbasal. *Flowers* small, usually dioecious. *Sepals* 4-5, small, imbricate. *Petals* 0. **MALE FLRS.**—*Stamens* numerous; anthers versatile, opening by slits. **FEM. FLRS.**—*Disk* annular or lobed, glandular. *Ovary* 2-8-celled with deeply intruded placentas; styles 2-10, short, free or connate; ovules 2, superposed. *Fruit* a drupe with several 1-seeded pyrenes.

- I. Leaves under 5 in. long not coriaceous, lateral nerves up to 5, slender:—

Leaves never long acuminate, spines usually under .4 in. across. Flowers solitary or in imperfect few flowered racemes; spines sometimes bearing leaves and flowers. Leaves .7-2 in. long.

1. *F. septara*.

Leaves usually long acuminate, chartaceous, spines much branched when present, (absent on old trees). Fruit .5-.7 in. across.

2. *F. Cataphracta*.

- II. Leaves up to 10 in. long, thickly coriaceous; lateral nerves 10-12, strong.

3. *F. sumatrana*.

1. *Flacourtia sepiara*, Roxb. Vern. *Thai-siao-gundi-khasiba*, Cach.

A shrub or small much branched tree attaining 25 ft. *Bark* grey, rough with exfoliating scales, spines usually axillary, stout, sometimes exceeding the leaves and bearing clusters of leaves or flowers, light yellow, somewhat granular, thin; young parts and petioles puberulous. *Leaves* 7-2 in., obovate, obovate-oblong or elliptic to suborbicular, apex rounded to shortly blunt acuminate, crenate-serrate; base cuneate to subcordate, glabrous, or slightly puberulous on the nerves at the base beneath, main lateral nerves 3-4 on either side, arched, the lowest more or less paired at or close to the base; petiole 1-2 in. long. *Flowers* small, usually 1-2 together at the ends of short shoots, rarely in imperfect racemes. **MALE FLRS.**—*Pedicels* slender, up to 3 in. long; sepals ovate, obtuse. **FEMALE FLRS.**—*With* shorter, and stouter pedicels and sepals broader than in male flowers. *Styles* usually 6-7. *Berry* with 6-7 pyrenes 25-3 in. across. *Pyrenes* rugose.

N. CACHAR HILLS, Gauhati (planted). Mann !

Flrs. 3-4. Fr. 4-5.

2. *Flacourtia Cataphracta*, Roxb. Vern. *Ponial* or *Poniol*, *Goch-poniol*, Ass. (Sibs); *Polian*, Ass. (Kam.); *Phinel*, Goalp.; *Tokroi*, Sylh., Cach. & Comilla; *Luk-Luk*, Sylh.; *Deng-soh-mukh*, Khasi; *Thengpi-kundu-arong*, Mik.; *Darichik*, Garo; *Phonial*, Mech.; *Duk-duki*, Tipp.

A small evergreen tree bearing compound spines on the trunk up to about middle edge, young shoots slightly pubescent; branchlets often with raised round lenticular dots. *Bark* cinnamon brown, fairly plain outside, uniformly light-brown inside, 1 in. thick. *Leaves* 2-5 by 1-2 in., ovate or ovate-lanceolate, long-acuminate, crenate, thinly chartaceous, quite glabrous; main lateral nerves 4-5 on either side of the midrib, the first 1-2 from near the base; tertiaries faint, transverse to the midrib, anastomosing; base rounded and then suddenly cuneate. *Flowers* small, in lax racemes which are axillary or spring from the extremities of short lateral shoots. **MALE FLRS.**—*Buds* globose, open .08 in. diam.; pedicels 4-6 in. long, very slender, glabrous; sepals orbicular, ciliate, hairy within; stamens about 50-80; filaments filiform, 1-12 in. long; anthers minute, globose. **FEM. FLRS.**—*Racemes* and pedicels somewhat shorter and the latter stouter; style conical, very short, stigmas 4-6, spreading. *Fruit* 5-7 in. across, globose, dark-purple when fully ripe, crowned by the persistent stigmas; stones 10-14.

Fairly common on both banks of the Brahmaputra below Sibsagar, e. g., Akhoyphutia, Dihoumukh, Garampani, Latabari, Lumding, Jamunamukh, Silghat, Tezpur, etc.; also KHASI HILLS. Not noticed in N.-E. FRONTIER and LAKHIMPUR DISTRICTS.

The wood is reddish, hard, compact and close grained and is used for agricultural implements. The acid ripe fruit is eaten.

Flrs. 3-4. Fr. 11-1.

3. *Flacourtia sumatrana*, Planch.

A small tree with a spreading crown; very young shoots slightly puberulous; branchlets with close round lenticel dots. *Leaves* 6-10 by 2.5-4.5 in., ovate-oblong or elliptic, suddenly acuminate, somewhat thickly and firmly coriaceous, rather coarsely and irregularly gland-serrate, rounded but sometimes abruptly cuneate at the base, glabrous and shining above; lateral nerves 10-12 on either half, depressed above, very prominent beneath, slightly arched, with midrib very sparsely pubescent or glabrate; tertiaries prominent, subparallel, transverse to the secondaries; quaternaries very slender, about .04 in. apart, transverse to the tertiaries, reticulate or subparallel; petiole .4-6 in. long, stout, shallowly channelled, puberulous or glabrate. *Flowers* very small, dioecious. *MALE* not seen. *FEM.* *FLRS.*—bracteolate, in axillary solitary or geminate panicles 1.5-3.5 in. long, rachis and its branches as well as the pedicels greenish grey pubescent. *Sepals* 5, broadly ovate-acuminate, concave, laciniose-ciliate, pubescent outside, minutely puberulous inside. *Dis* annular or slightly wavy, very fleshy. *Ovary* ovoid, glabrous; styles 4, tapering to a minute stigma, glabrous. *Drupe* berry-like, .2-2.5 in. long, ovoid or oblong; stones generally 6; albumen oily; embryo minute.

Only one found at Nagadhuli, near Mariani, DISTRICT SIBSAGAR, (Sheet No. 1781).

The above description applies to the form growing in our area.

Fr. 9.

Flacourtia inermis, Roxb.—Unarmed small tree: young parts puberulous. *Leaves* 4-8 by 2-3.5 in., ovate or oblong-lanceolate, acute or acuminate, coriaceous, glabrous and shining above, midrib pubescent beneath; petiole .35-.5 in. long; *Flowers* 2-sexual in short fascicled pubescent racemes. *Ovary* 5-celled, cells 2-ovuled. *Fruit* red, size of a cherry, acid with 8-10 pyrenes.

Said to occur in SYLHET and to be cultivated in other parts of India presumably for its fruit. I have never come across it nor are there any specimens at Calcutta herbarium from our area.

5. XYLOSMA, Froster.

Differs from *Flacourtia* as shown in the diagnosis given in the generic key. *Style* usually 1, placentas usually 2, rarely more parietal.

Leaves generally oblong-lanceolate, firmly coriaceous; lateral nerves 8-12, short and slightly arched; tertiaries scarcely parallel, conspicuously reticulate.

... 1. *X. longifolium*.

Leaves generally elliptic lanceolate, thinly coriaceous; lateral nerves 6-8, long and much arched; tertiaries parallel or subparallel and transverse to the midrib.

... 2. *X. controversum*.

1. *Xylosma longifolium*, Clos. Vern. *Mota-koli*, Ass. (Sibs. & Darr.); *Kata-hoh*, *Kotahar*, *Kata-ponial*, Ass.; (Kam.); *Mota-puli*, Ass. (Lakh.) & *Miri*; *Dieng-kani*, *Khasi*; *Ihengpiam-arong*, Mik.; *Phul-wal*, Garo; *Tang-en-ising*, (N. Lakh.), *uli-tang-asing*, Mimi; *Hagrani-sa*, Cach.; (wild tea).

A tree up to 60 ft., in height and 4 ft., in girth, thorny when young, often multiplying by root-suckers. *Bark* fairly smooth, but with large black warts, greenish below the cuticle, .2-.5 in. thick, inside yellowish-brown, turning deeper brown on exposure. *Leaves* 4-7 by 1-2.5 in., oblong, rarely elliptic-lanceolate, acuminate, obtusely glandular serrate with recurved margin, firmly coriaceous, glabrous, pinkish when very young, shining above when adult; lateral nerves 8-12, slender, irregular, moderately arched, short; tertiaries rather strongly though laxly reticulate; base acute; petiole .3-.5 in. long, narrowly margined. *Flowers* dioecious, yellow, .15 in. across, in short dense axillary racemes, which are fascicled or paniced, .3-1 in. long; pedicels .15-.25 in. long, articulate near the base, lengthening in fruit, puberulous or glabrous; bracts minute, oblong to ovate-acuminate; sepals 5 orbicular or ovate, arose at the margin. *MALE FLS.*—*Stamens* 15-20; filiform, surrounded by a disk with about 10 pink glandular lobes. *FEMALE FLS.*—*Ovary* glabrous, seated on a lobulate glandular disk; style 1, short; ovules few. *Fruit* globose, more or less dry, red when ripe with 2-8 sector-shaped seeds (or stones?).

Fairly common throughout UPPER ASSAM near swamps and streams. The wood is brownish moderately hard and even-grained, weighing 55 lbs per c. ft., not used as timber. The Mikirs prepare an extract from the tender young leaves which resembles opium and is used with it (whence the Mikirs name).

Fls mainly 11-1

2. *Xylosma controversum*, Clos.

A small tree up to 35 ft. in height and 2 ft. in girth; stem with simple spines. *Bark* greyish-brown, rough with close-set warts and with distant horizontal wrinkles, inside dun-brown with small streaks of amber brown, finely fibrous, rather soft and "cheesy." *Leaves* 2-6 by 1-2.5 in., elliptic-ovate or obovate-lanceolate, finely acuminate, shallowly gland-serrate, thinly coriaceous, glabrous, shining above, dull underneath; lateral nerves 6-8 on either half, very oblique, prominent underneath; tertiaries subparallel, transverse to the midrib, anastomosing by very slender nerves of the next degree; base very gradually cuneate; petiole .3-.4 in. long, sharply margined. *Flowers* almost as in the preceding species, but are always paniced and the panicles are larger being up to 1.5 in. long and somewhat more lax; pedicels shorter and the bracts usually narrower. *Sepals* suborbicular to ovate, unequal, arose-ciliate, adpressed silky inside. *Stamens* 25-40. *Fruit* as in the other species; seeds plano-convex, smooth, shining.

Kantib-behch and elsewhere in the Mikir Hills SIBSAGAR, 2-2500 ft. But the home of this tree is the KHASI HILLS, where it extends up to 5000 ft. Fls 11-2. Fr 7-10

6. CASEARIA, Jacq.

Shrubs or small trees. *Leaves* distichous, often with translucent dots or dashes, entire or serrate; stipules small, lateral caducous. *Flowers* small, yellowish-green, regular, usually 2-sexual,

clustered in axils of the leaves ; pedicels short, jointed, surrounded by small scales. *Calyx* inferior, deeply 4-5-lobed, persistent. *Petals* 0. *Stamens* 6-10, united into a tube, with staminodes alternating with the free portion of the filaments or nearly free, hypogynous or subperigynous ; anthers introrse. *Ovary* 1-celled, ovoid ; style simple ; ovules numerous on 3-4 parietal placentas. *Capsule* succulent, 3-nerved, globose or ovoid. *Seeds* many with a scarlet aril ; embryo straight ; cotyledons flat.

I. Adult leaves and branches glabrous :—

Leaves elliptic or lanceolate, regularly crenate or crenulate. *Calyx* pubescent outside. Fruit ellipsoid. ...

.. 1. *C. glomerata*.

Leaves elliptic or lanceolate, cuneate at the base, entire or obscurely crenulate. *Calyx* glabrous.

2. *C. esculenta*.

II. Adult Leaves and branchlets more or less pubescent :—

A shrub. Leaves oblong, closely serrate. Pedicels glabrous above, the articulation. Fruit small bright-red or orange globose.

.. 3. *C. Vareca*.

A middlesized tree. Leaves lanceolate, narrowed at both ends, crenate or nearly entire. Pedicels very long, pubescent. Fruit middlesized, ellipsoid.

.. 4. *C. Kurzii*.

1. *Casearia glomerata*, Roxb. Vern. *Tel-bhurki*, Ass. ; *Kachidohkka*, *Dreng-chi-dohkka*, *Sia-dokha* (Fish-bone), Kh. ; *Han-bo-akarang*, Mikir. ; *Bolong-maindok*, or—*maindop*—or *maindot*, *Boldreng Bol-dajagreng*, Garo ; *Dukhenda*, *Datphenda*, Mech. ; *Midoumaphang*, Kach. ; *Kharo-an*, Kuki ; *Khelret-thing*, Tipp. ; *Borkemla*, Nep.

Usually a small deciduous tree, (an individual tree 45 ft. in height and 6 ft. 3 in. in girth was met with in the Chima-Bangsi Reserve in the Garo Hills in March 1925) ; crown spreading. *Bark* 3 in. thick, rough, greyish-brown outside, sometimes covered with a mealy black powder, green below the epidermis ; inside whitish, turning yellowish-brown on exposure with vertical strands of amber-brown. *Leaves* 4-8 by 1.7-4 in., lanceolate or elliptic-lanceolate, acuminate (bluntly when the leaf is elliptic), denticulate or crenate, never quite entire, thinly coriaceous when fully mature ; base acute or cuneate, never rounded or cordate ; petiole 2 in. long. *Flowers* small, greenish-yellow or yellowish-brown ; pedicels in very dense fascicles, pubescent, up to 2 in. long or glabrous. *Calyx* small, funnel-shaped, more or less pubescent outside. *Stamens* 8-10, alternating with villous linear staminodes. *Fruit* (in March, apparently mature) 6.5-8 in. long, ovoid elliptic, pulpy. *Seeds* about 15 in. diam., white or ovoid-globose.

Common in the BRAHMAPUTRA VALLEY excepting in LAKHIMPUR and the N.-E. FRONTIER DISTRICT ; also in GARO, KASHI and MIKIR HILLS.

Wood white, not used. The young leaves and tender shoots are eaten, either as a vegetable or cooked with rice and fowl, specially by the Mikirs with whom it is indispensable for offerings to their Gods and in ceremonial feasts.

It coppices fairly well. The leaves urn copper-coloured before falling

Frs. 1-2. Fr. 3-5

Casearia graveolens, Roxb.—appears to be hardly more than a form of this species. It is supposed to differ mainly by its pedicels being glabrous above the articulation. This character is however by no means constant. Typical *C. graveolens* is rare in Assam but does occur in NOWGONG and KHASI HILLS.

2. *Casearia esculenta*, Roxb. Vern. *Dieng-soh-lormao*, Kh.; *Bolduiagreng*, Garo; *Kron-suri-arong*, Mik.

A small tree about 20 ft., in height and 18 in. in girth. *Bark* white, plain but warty outside, granular and yellowish with white vertical streaks inside. *Leaves* 3-5 by 1·2-2 in. elliptic-lanceolate, narrowed at both ends, entire or very obscurely crenate, subcoriaceous, glabrous and shining, reticulate beneath; petiole 3-5 in. long. *Flowers* axillary, yellowish. *Stamens* 8, united at the base with the disk. *Capsule* about 5 in. long; often attacked by gall insects; aril bright red.

Mawlong forest in the KHASI HILLS; Sugiri, GARO HILLS; Hailong, N. C. HILLS, ascending to 3500 ft.

The Mikirs eat the leaves and tender shoots cooked in curry.

Flrs. 9-10. Fr. 1-3.

3. *Casearia Vareca*, Roxb. Vern. *Bhagni* or *Roy-baghini*, *Chhaglawi* or *Chhagladuri*, *Sikrai* or *Sikraguti*, *Chhikramarg*, Ass.; *Bon-jhalukia*, Ass. (Sibs.) *Dieng-soh-rang*, *Dieng-sapet-khuntlung*, Synt.; *Tiho-okron-arong*, *Joumakron*, *Akron-arong*, Mik.; *Abbuk-asung*, Abor; *Saben-bukhen-asung*, Miri; *Asari-baphang*, Kach.; *Nelo-changne*, Duff.; *Thing-batiat*, Kuki; *Daino*, Jharua (Dalu); *Nak-pek*, Tipp.

A large shrub, rarely a small tree (25 ft. high and 4 in. diam. in the Deroi Reserve, SIBSAGAR). *Branches* often starting from the base; young shoots straight, rather angular, pubescent. *Bark* grey, warty with white blotches outside, green below the dead layers, light-brown, turning into red after exposure inside, about 25 in. thick. *Leaves* 3-6 by 1-2 in., generally oblong-lanceolate, obtuse and often abruptly apiculate to acuminate, closely serrate or serrulate, subcoriaceous, glabrous above, pubescent or puberulous at least along the nerves beneath; base cuneate; petiole 3-5 in. long. *Flowers* greenish-grey, in dense axillary clusters; pedicels very hairy below the joint, glabrous or nearly so above it. *Calyx* bowl-shaped, lobes broad ovate to suborbicular, about 1 in. long. *Staminal tube* elongated; filaments usually 8, rarely 10 a little shorter than the anthers, pubescent, alternating with the broad hair tipped staminodes. *Fruit* oval, 2-4 in. long, smooth, bright orange yellow. *Seeds* 4-6, oblong, attached to the middle of the valve, enveloped in a thin bright-red aril; embryo straight, cotyledons cordate.

Distributed all over the province and up to 3,000 ft., in the HILLS.

The fruit is rubbed into a paste and given to people suffering from worms, while the juice of the fruit is dropped into the ear when attacked by ticks.

Flrs. 6-9. Fr. 10-4. (chiefly mid-winter.)

4. **Casearia Kurzii*, C. B. Clarke. Vern. *Dieng-bai-synrang*, Kh. (Shella); *Dieng-soh-mara*, Kh. (Nongkla), *Shokshi-maring*, *Boldujagreng*, Garo.

Generally a middle-sized tree up to 50 ft. in height, but sometimes attaining 80 ft., in height 5 ft. in girth; shoots pubescent. Bark grey corky outside, plain green underneath the cork, generally with horizontal wrinkles below each living or fallen branch; inside light greenish-brown, 25 in. deep, with an unpleasant smell. Leaves 3-6 by 1·2-2 in. lanceolate or oblong, narrowed at the base, which is more or less oblique, acute or shortly acuminate, distantly crenate or nearly entire, subcoriaceous, glabrous above, with spreading yellow hairs beneath, specially when young; turning yellow before falling: petiole nearly 5 in. long, puberulous. Flowers in fascicles of 4-6 from axillary tubercles; often attacked by gall insects; pedicels slender, pubescent, 2-4 in. long. Ovary minutely pubescent. Stamens generally 10. Capsule nearly 6 in. long, black when ripe, eaten by birds.

Shella, Nangkha etc., on the southern slopes of the KHASI HILLS; Haflong, N. C. HILLS; Rongmachakgiri, Fulbari, GARO HILLS; Subhimalayan Sal-track, GOALPARA, c. g. Bomba Block; Burduar Reserve, KAMRUP.

The fresh-cut wood is yellowish-white, even-grained, believed to be durable by the Khasis who use it for rafters.

Flrs. 4-5. Fr 1-2 (of the following year!).

15. *PITTOSPORACEÆ*.

Trees or shrubs sometimes climbing. Leaves alternate or subverticillate, entire, very rarely toothed. Flowers hermaphrodite. Inflorescence various, terminal or axillary. Sepals 5, imbricate, free or connate. Petals 5, hypogynous, imbricate, free or connate. Torus small. Stamens 5, free; anthers versatile. Ovary 1-celled with 2-5 parietal placentas, or as many celled by the projection of placentas; style simple, stigma terminal 2-5 lobed; ovules many. Fruit capsular or indehiscent (in some foreign species). Seeds many, albumen copious, embryo minute.

PITTOSPORUM, Banks.

Erect trees, shrubs or undershrubs. Inflorescence usually corymbose, subumbellate or paniculate. Sepals 5, free or connate below. Petals erect, claws connivent or connate, often recurved in fully opened flowers at the top. Filaments subulate; anthers

2-celled, introrse, opening by slits. *Ovary* incompletely 2-3 celled by the intrusion of the placentas; ovules 2 or more on each placenta. *Capsule* 1-celled, 2-3 valved; valves placentiferous in the middle and often striate with horizontal lines inside; seeds covered by oily resinous pulp.

- I. Tall shrubs or small trees :—
 - Flowers in simple racemes or corymbs; capsule 3-valved, 7-1 in. long ellipsoid or obovoid oblong. ... 1. *P. glabratum*.
 - Flowers in panicles, corymbs or umbels; capsule 2-valved, 5 in. across, globose. ... 2. *P. floribundum*.
- II. Undershrubs, usually under 3 ft. in height. ... 3. *P. humile*.

1. **Pittosporum glabratum**, Lindl. Vern. *Dieng-thyllong*, *dieng-sanyar-un*, *dieng-lo-shiring-synrang*, *dieng-soh-tylluh*, Khasi.

An erect shrub 8-10 ft. high with light grey to blackish bark, blaze white, fibrous. *Branchlets* often whorled, young shoots and inflorescence covered with tufted, glandular hairs. *Leaves* opposite, or whorled, some alternate, very variable in size and shape, 1.5-7.5 by .5-1.2 in., oblong-lanceolate, oblanceolate, obovate or elliptic, acuminate or acute, entire, margins slightly revolute, coriaceous, glabrous, shining above, pale beneath; base attenuated, lateral nerves faint, impressed above, very oblique; petiole channelled up to .2 in. long. *Flowers* pale yellow in terminal and subterminal short racemes or corymbs, which are up to 2.2 in. long and covered at the base with small imbricating sharp-pointed triangular scales; racemes 3-10 flowered; bracts and bracteoles up to .1 in. long. *Pedicels* slender, lax .25-.5 in. long. *Calyx* .1 in. long, more or less glandular hairy; lobes triangular, ciliate. *Petals* .5-.6 in. long, claws connate in a cylindrical tube or sometimes free, limbs spreading, obovate-oblong, sub-acute, slightly hairy within or entirely glabrous; anthers apiculate, opening by slits. *Ovary* shaggy, shortly stalked; ovules many. *Capsule* up to 1 in. long, obovoid or ovoid oblong or ellipsoid, usually with a narrowed base, tipped by the persistent style, shortly stipitate, 3 valved, prominently striate inside with horizontal lines. *Seeds* remaining long attached by funicles after dehiscence of capsule, somewhat compressed and faceted ventrally, pulp red or orange-red, viscid.

KHASI & JAINTIA HILLS, also MANIPUR and NAGA HILLS 3000-6000 ft. Flowers 3-6. Fr. 9-1.

2. **Pittosporum floribundum**, W. & A. Vern. *Dieng-mulo-shi-ing*, *dieng-si-ing* (=ginger tree from the smell of the bark), *dieng-duma*, Kh.

A small tree attaining about 25 ft. in height, branches subverticillate, bark grey with large warty lenticels, white and fibrous inside. *Leaves* crowded towards the ends of branches, sometimes subverticillate, 3-6 by .7-1.5 in., oblong lanceolate oblanceolate or lanceolate, acuminate, margin undulate, subcoriaceous, nerves impressed above, secondaries rather obscure,

7-11 on either side of midrib, oblique, terminal portion parallel with the margin, tertiaries finely reticulate, base attenuated to the channelled petiole which is up to 5 in. long. *Flowers* pale yellow about .25 in. long, sweet scented. *Inflorescence* consisting of a terminal panicle of corymbs or umbels with the axis sometimes very reduced, much smaller than the leaves, usually up to 1.7 in. long by 3.5 in. across, glandular-pubescent, base often covered with early deciduous, broadly ovate, acute scales .25 in. long; bracteoles .15 in. long, ovate oblong; peduncles of the main panicle branches up to 1.5 in. long; pedicels up to .25 in. long. *Sepals* free .1 in. long, ovate or elliptic-oblong, obtuse, pubescent or glabrate outside. *Petals* .25 in. long, narrow oblong. *Ovary* adpressed hairy; style glabrous. *Capsule* orange-yellow, .3 in. across-2 valved, globose, crowned by the remains of the style; valves striate with horizontal lines; seeds covered with scarlet pulp.

KHASI HILLS, 3000-4000 ft., usually on broken ground.

The bark has an unpleasant smell when freshly cut. The branches of panicles sometimes arise from upper leaf axils.

Flowers 3-5. Fr. 10-1.

3. *Pittosporum humile*, Hk. f. & Thom.

A small bushy undershrub 2-3 ft. high with greyish stem; branchlets lenticellate; young parts glabrous. *Leaves* 1-2.5 by .2-4 in. narrow lanceolate, gradually acuminate or acute, margins slightly revolute, coriaceous, glabrous, dark green and shining above, paler beneath, base tapering into the short channelled petiole, secondary nerves faint, oblique, tertiaries impressed above and prettily reticulated. *Flowers* white .2-.25 in. long, in 2-5 flowered peduncled subumbellate, pubescent racemes, which are terminal or from upper leaf axils. *Peduncles* up to .6 in. long; bracteoles up to .2 in. long, often gland ciliate; pedicels up to .2 in. long. *Sepals* .1 in. long, free, oblong or ovate-lanceolate, acute or obtuse, often ciliate. *Petals* free, .2-.25 in. long, strap-shaped, recurved at the tip in open flowers; filaments glabrous. *Ovary* glabrous; placentas 2; ovules several. *Capsule* subglobose, .25 in. across, tipped by the persistent style, rugose outside, red and horizontally striate inside. *Seeds* compressed, laterally covered with deep red aril.

KHASI HILLS, 3000-5000 ft.

Flowers 4-6. Fr. 9-11.

Leaves towards the ends of shoots sometimes very small. The shoots smell somewhat like garlic when bruised.

FAM. 16. POLYGALACEÆ.

Erect or climbing trees or shrubs. *Leaves* alternate, simple, exstipulate, quite entire. *Flowers* hermaphrodite, irregular, 2-sexual, 2-bracteate. *Sepals* and *petals* 5 each, imbricate, unequal, inner 2 sepals often petaloid and larger. *Stamens* 8, rarely fewer; filaments generally united into a hypogynous sheath. *Ovary* free, 1-3 celled, with 1 or more ovules in each. *Fruit* generally a capsule or indehiscent and 1 seeded and sometimes samaroid, or of indehiscent carpels.

Herbs or less often shrubs, fruit capsular. . . .

1. *Polygala*.

Climbing shrubs; fruit samaroid. . . .

2. *Securidaca*.

Trees (in our area): fruit indehiscent, not winged. . . .

3. *Xanthophyllum*.

1. POLYGALA, Linn.

1. *Polygala arillata*, Hamilt. Vern. *Dieng-soh-tyuka*, *Dieng-jatya*, Kh.

A shrub 1-8 ft., sometimes more in height, young parts pubescent or puberulous. *Leaves* 3-6 by 2.5 in, lanceolate, elliptic-oblong, or obovate-lanceolate, acuminate, entire subcoriaceous, glabrous; base rounded or cuneate, nerves prominent, secondaries 6-8 on either half, arcuate and forming loops near the margin, tertiaries reticulate; petiole 2-4 in. long. *Flowers* .5-.75 in. long, many, in pubescent drooping racemes 2.5-10 in. long, which are sometimes panicle when terminal; bracts minute, linear or lanceolate early deciduous; pedicels .15 in. long. *Sepals* glabrous, unequal, upper concave, .3 in. long, two lower much smaller ovate, inner two petaloid, .5-.75 in. long, purple, obovate. *Petals* 3, yellow, united at the base with the staminal sheath, the lowermost keel-shaped, crested with a tuft of linear segments and united to the lateral petals for about three-fourth their lengths. *Stamens* 8, united for their lower half into a hypogynous split sheath; anthers opening by pores. *Ovary* 2 celled; ovule 1 in each cell, pendulous. *Capsule* 2-celled, loculicidal, .5-.6 in. across, broader than long, subreniform, usually notched at the apex, margined, more or less fleshy rugose with prominent veins when dry; seeds 2, globose, strophiole.

CACHAR, KHASI and JAINTIA HILLS up to 4000 ft.

Flrs. 5-8 ? Fr. 11-2.

The following herbs with woody rootstocks may be mentioned :—

1. *P. crotalarioides*, Ham.—An undershrub or a perennial herb attaining about 12 in., covered with spreading hairs. *Leaves* 1-2.5 in. long obovate or oblanceolate, apex rounded, often apiculate. *Racemes* usually shorter than the leaves, densely flowered; bracts and bracteoles minute, persistent. *Flowers* .25-.3 in. long, purple or purplish white; pedicels minute. *Capsule* .15-.25 in. across, orbicular margined ciliate. *Seeds* hairy; strophiole deeply 3-fld.

KHASI HILLS.

Flrs. & Fr. 5-9.

2. *P. leptalea*, DC.—A slender erect herb attaining about 20 in. with glabrous striate often angled branches. *Leaves* 7.5-1.25 in. linear narrowed at both ends; petiole scarcely any. *Flowers* pink, 1.5-2 in. long, in dense terminal and axillary racemes. *Capsule* broad obovoid, margined about .15 in. long. *Seeds* hairy.

*CACHAR (Prazer). KHASI & JAINTIA HILLS up to 4000 ft.

Fls. & Fr. 5-1.

3. *P. glomerata*, Lour.—A much branched undershrub or perennial herb attaining 24 in. *Stems* pubescent, ascending, switchy. *Leaves* variable 1-2.5 in. long, linear-lanceolate or oblong to broad ovate and elliptic mucronate, rounded or obtuse at the apex, glabrous or slightly pubescent; petiole very short, hairy. *Flowers* drooping, greenish 2.5-3 in. long in few flowered, very short pubescent, extra-axillary racemes. *Outer sepals* ciliate, acuminate; wings awned. *Capsule* 1.5-2 in. broad, as broad as or broader than long, narrowly margined, notched at the apex, ciliate. *Seeds* silky, strophiole with 3 appendages.

KHASI & JAINTIA HILLS up to 5000 ft. CACHAR—Prain! and probably also in other Districts.

Fls. & Fr. 4-11.

4. *P. sibirica*, Linn.—A very variable perennial herb, attaining up to 18 in. in length, stems many, slender. *Leaves* 4-1 in. elliptic-lanceolate, upper surface usually shining glabrate or with few minute hairs, veinlets prominently reticulate, margins slightly recurved; petioles very short. *Flowers* purple 2-2.5 in. long, in extra axillary racemes, which are usually 3-1.5 in. long, minutely pubescent and lax. *Outer sepals* subequal. *Capsules* .25 in. across, glabrous, suborbicular obcordate, notched at the apex, broadly margined. *Seeds* pilose, strophiole with 3 short appendages.

KHASI HILLS up to 5500 ft.

Fls. & Fr. 3-10 ?

2. SECURIDACA, Linn.

Securidaca tavoyana, Wall. Vern. *Phakehena-lata*, Ass.

A woody climber with dark brown stem; fibre strong, fine silky, young shoots puberulous. *Leaves* 3-5 by 1-2 in. elliptic, obovate-oblong or oblanceolate, abruptly acuminate, generally cuneate at the base, quite entire, thinly coriaceous, minutely and sparsely pubescent or glabrate and deep green above, more densely and permanently pubescent and pale beneath; main lateral nerves 8-12 on either half, generally very oblique, the first pair sub-basal, tertiaries very openly reticulate; petiole 2-3 in. long. *Flowers* pink, 2-3 in. across, in axillary and terminal panicles 4-9 in. long; pedicels filiform, 2-5 in. long, gradually shorter towards the apex of each branch of panicle. *Sepals* ovate or elliptic. The two innermost petals from a keel to which the lateral petals are adnate at the base, the latter truncate and generally tipped with yellow. *Ovary* 1-celled, 1 ovuled; style lateral and sharply curved near the extremity, developing into a wing in fruit. *Samaras* 1-celled, 2.5-4 by .6-1 in. with the wing; wing oblique broadest towards the apex, tip rounded or obtuse, thickened at the inner edge, closely veined; veins arcuate, furcate at the outer edge; nucleus irregularly tubercled. *Seed* generally solitary, .3-.35 in. long, suborbicular, compressed, exalbuminous; cotyledons oily.

Fairly common in all Districts of UPPAR ASSAM excepting NOWGONG.

Fls 9-10, Fr. 12-2.

3. XANTHOPHYLLUM, Roxb.

Xanthophyllum flavescens, Roxb. Incl. *X. virens*, Roxb.

A medium sized to large tree. *Bark* grey, warty and corky outside. *Leaves* 3-7 by 1·1-3 in., oblong-lanceolate to elliptic lanceolate, acuminate, coriaceous, glabrous, yellowish when dry; main lateral nerves 5-7, often with a few perforated glands at the axils or at the angles of nervules, nervules prominent beneath; petiole 25 in. long. *Flowers* pale yellow, zygomorphic, 3-5 in. long in terminal and axillary pubescent panicles; pedicels up to 2 in. long. *Sepals* 5, unequal, suborbicular, pubescent. *Petals* 4-5, subequal, much exceeding the sepals, lowermost keel-shaped. *Stamens* 8, 2 inserted on the disk, 6 attached to the base of the petals; disk hypogynous, annular, lobed. *Ovary* stipitate, densely strigose, 1-celled; ovules 1-12. *Fruit* indehiscent, globose, 6 in. across with thick walls, 1-seeded. *Seeds* exalbuminous.

CACHAR—Haflong, GARO HILLS—Rongrengiri, KHASI HILLS, Kurz !

Flrs. 3-4.

FAM. 17. TAMARICACEÆ.

Ultimate branchlets slender and green, somewhat resembling the needles of pines. *Leaves* alternate, minute, usually scale-like and adpressed on the branchlet, sometimes amplexicaul or sheathing exstipulate. *Flowers* regular, 2-sexual or 1-sexual, in simple or paniced spikes or racemes. *Sepals* and *Petals* usually 5, each imbricate, free or connate below. *Stamens* usually as many or twice as many as the petals, on a hypogynous or subperigynous glandular or lobed disk, free or connate; anthers versatile. *Ovary* free, 1-locular or imperfectly septate; styles 2-5, free or connate or stigmas sessile and 3-5; ovules 2- numerous on basal placentas. *Fruit* a capsule dehiscing into 3-5 valves. *Seeds* hairy or winged, albuminous.

TAMARIX, Linn. Tamarisk.

Tamarix dioica, Roxb. Vern. *Jhau* or *Lul-jahu*, Beng. & Ass.; *Rupun-asing*, Miri.

A handsome gregarious shrub up to 15 ft. in height with spreading branches; leaf scars concentric. *Bark* reticulately cracked. *Leaves* minute, about 0·5 in. long, tubular and clasping the stem, acuminate, green but with white margins. *Flowers* pink, 5-merous about 12 in. across, very numerous in compact peduncled usually paniced spikes, generally dioecious; bracts

up to nearly as long as the flowers, triangular, acuminate. keeled. *Sepals* about half as long as the petals, elliptic, ovate or elliptic, margins membranous. **MALE FL.:** *Petals* oblong. *Stamens* 5, longer than the petals, inserted between the notches of a 5-lobed disk; filaments ligulate; anthers purple. **FEMALE FL.:** *Petals* broader than in the males. *Staminodes* shorter than the petals usually with sagittate pale anthers, which are sometimes absent. *Ovary* 1-celled, 3-lobed; styles 3, longer than the petals. *Capsule* conical, 1-celled, 3-valved; seeds minute, plumose, numerous, compressed.

Very common along the banks of the Brahmaputra and its tributaries and generally under water during the rains.

Flrs. 7-9 l'r. 10-12.

FAM. 18. HYPERICACEÆ.

Herbs or shrubs rarely trees. *Leaves* opposite, extipulate, often punctate with pellucid glands or dark glandular dots, entire or gland toothed; stipules (). *Flowers* solitary or terminal, rarely axillary. *Sepals* and petals 5-4. *Petals* contorted in bud. *Stamens* indefinite, rarely definite, 3-5-adelphous, rarely free or all connate; anthers versatile. *Ovary* 3-5 or 1-celled, with 3-5 filiform free or united styles; ovules many or few on axile or parietal placentas. *Fruit* usually capsular. *Seeds* exalbuminous, embryo straight or curved.

HYPERICUM, Linn.

Herbs or shrubs, rarely trees. *Leaves* usually sessile or subsessile. *Flowers* yellow, terminal or axillary; inflorescence cymose. *Sepals* and petals 5, the former persistent, the latter usually oblique. *Capsule* septicidal or dehiscent along the placentas when one celled; usually tipped by the persistent styles.

- I. Stamens 5-adelphous, ovary 5-celled; styles 5:—

Leaves broad, 1' 2-2 by '5-1'2 in.					
Shrub 6-8 ft. high.	....	1.	<i>H. Hookerianum.</i>		
Leaves narrow '5-1 by '15-'5 in.	....			
Shrub up to 4 ft. high.	....	2.	<i>H. patulum.</i>		
- II. Stamens 3-adelphous, ovary 3 celled; styles 3:—

Sepals with 4land tipped teeth.					
	....	3.	<i>H. elodeoides.</i>		

1. *Hypericum Hookerianum*, W. & A., Syn. *H. oblongifolium*, *Flk. /.* Vern. *Lasyn-heh*, or *Mat-iar-stem*, Khasi.

An evergreen shrub about 6-8 in. in height with reddish brown bark. *Branchlets* usually opposite, terete. *Leaves* usually 1.2-2 by .5-1.2 in. ovate to ovate-oblong, subacute or obtuse, apiculate, margins revolute, thinly coriaceous, glabrous; lateral nerves distant, 4-5 on either side of the midrib ascending and convergent towards the apex, pellucid punctate, undersurface glaucous; petiole minute or nil. *Flowers* up to 2 in. across, yellow, in few flowered terminal corymbose cymes; bracts leafy; pedicels .25 in. long, 2 bracteolate. *Sepals* up to .25 in. long, unequal, broadly obovate, or elliptic, glabrous. *Petals* upto 1 in. long, suborbicular or broad ovate, often obliquely cuneate. *Stamens* 5-adelphous at the base; filaments yellow. *Ovary* equaling the styles; styles 5, exceeding the stamens, free nearly to the base. tips recurved. *Capsule* up to .7 in. long, oblong-ovoid, seated in the persistent calyx.

KHASI AND JAINTIA HILLS 3000-6000 ft., NAGA HILLS.

Flowers 4-6. Fr. 10-11.

In some forms the leaves attain 3.5 in. in length.

2. *Hypericum patulum*, Thunb. Vern. *La-syn-rit*, *Diengsyntia-samun*, Kh.; *Dieng-soh-sarlain*, Synt.

A small shrub upto 4 ft. in height, with reddish brown sometimes nearly black bark. *Branchlets* close set, often opposite, stiff, more or less margined along the internodes below the insertions of leaves. *Leaves* usually .5-1 by .15-.4 in., usually distichous, narrow lanceolate, or oblong or ovate-lanceolate, subacute or obtuse, minutely apiculate, margin slightly recurved, glabrous, pellucid punctate, undersurface glaucous or rusty brown black dotted; lateral nerves rather indistinct up to 6 on either side of midrib, ascending and convergent towards the apex, base narrowed to the minute petiole. *Flowers* yellow .7-1.5 in. across, in few flowered terminal cymes. *Pedicels* with 2 foliaceous bracts near the top; pedicels up to .25 in. long; bracteoles minute. *Sepals* 5, free, .25-.3 in. long, elliptic, obtuse, glabrate, dotted with pellucid glands. *Petals* 5, .4-.5 in. long, suborbicular, broadly obovate, often oblique, early deciduous. *Stamens* much shorter than the petals collected into 5 bundles at the base. *Ovary* exceeding or equalling the styles; styles 5, lower portions connate. *Capsule* ovoid, .4 in. long; valves persisting for a long time

KHASI & JAINTIA HILLS 3000-6000 ft., MANIPUR, NAGA HILLS.

Flowers 5-7. Fr. 9-10.

Leaves are usually small in the form commonly found in our area.

3. *Hypericum elodeoides*, Choisy.

A perennial herb or undershrub up to 2 ft. high. *Leaves* variable, usually .5-1.2 by .2-.4 in. sessile; subamplexicaul, upper with a fringe of bristly glands at the base, lanceolate, oblong or ovate, acute or obtuse, subcoriaceous, pellucid-punctate, margins usually black glandular, secondary nerves convergent towards the apex.

lower 1-2 pairs basal. *Cymes* compound, terminal and sub-terminal. *Flowers* up to .6 in. across, yellow; bracts linear or oblong with setose gland-tipped teeth. *Sepals* connate at the base, .3 in. long, lanceolate with long, glandular teeth. *Petals* exceeding the calyx, .3 in. long, obovate, black dotted. *Stamens* 3-adelphous at the base. *Styles* 3, divided to the base, exceeding the ovary. *Capsule* .3 in. long.

KHASI HILLS, 4-6000 ft.

Flowers 6-7. Fr. Autumn.

Leaves in some forms only .1 in. broad.

H. monanthemum, *Hk.f. & T.* A slender perennial herb similar to some forms of the above. *Leaves* .5-.75 in. long, oblong, elliptic or ovate; obtuse, pellucid punctate, and marginally glandular. *Cymes* few flowered; bracts glandular fringed. *Sepals* gland toothed. *Petals* with few black dots. *Style* shorter than the ovary. *Capsule* about .25 in. across. Hardly more than a herbaceous form of *H. elodeoides*.

KHASI HILLS, 6000 ft.

Flowers 4.

H. Sampsonii, *Hance*. — A perennial herb about 1 ft. high. *Leaves* sessile .9-2 by .4-.6 in. oblong, rounded at the apex, connate at the base, dotted on both surfaces; lateral nerves 3-4 pairs, convergent towards the apex, undersurface glaucous. *Flowers* comparatively small in lax terminal and axillary peduncled cymes; peduncles up to .2 in. long. *Sepals* 5, .25-.35 in. long, oblong, subacute, black dotted, connate at the base. *Petals* 5, about equalling sepals, oblong. *Stamens* 3-adelphous at the base. *Styles* 3, much shorter than the ovary. *Capsule* .25 in. long, enclosed by the persistent calyx and covered with resinous vesicles.

KHASI HILLS, NOWGONG, *Simmons*.

H. breviflorum, *Wall.* — An undershrub up to 18 in. long. *Leaves* 1-1.5 by .2-.3 in. oblong, or oblong-oblancoate, obtuse or subacute at the apex; lateral nerves 3-4 pairs, ascending, undersurface gland dotted; base narrowed to the minute petiole. *Cymes* axillary and terminal, few flowered, short peduncled. *Sepals* 5, entire, oblong-ovate, obtuse about .15 in. long. *Petals* not seen. "*Stamens* 9 in 3 bundles cohering for $\frac{1}{2}$ their lengths and separated by hypogynous scales." — *Hooker*. *Ovary* exceeding the sepals; styles 3, shorter than the ovary. *Capsule* .3 in. long, ovoid.

KHASI HILLS, 5000 ft. *Hooker* ! *Kurz* !

H. japonicum, *Thunb.* — A slender much branched annual 3-12 in. long. *Leaves* .15-.3 in. long ovate, or elliptic, pellucid dotted, covered with black glands beneath. *Flowers* .25 in. long in lax terminal dichasia or solitary in the upper axils. *Sepals* entire, narrow-lanceolate. *Petals* little shorter than the calyx, marcescent. *Stamens* connate at the base; styles usually 3, shorter than the ovary. *Capsule* equalling the persistent sepals.

KHASI HILLS, Plains of ASSAM in scrubs and grass lands, KAMRUP, SYLHET, DARRANG, LAKHIMPUR, SADIYA, SIBSAGAR, LOWER ASSAM (*Kurz*) — probably all over the province.

Flowers 2-6 according to elevation. Fr. 8-11.

H. Lalandii, *Choisy*. — A slender unbranched tufted annual attaining 18 in.; stems with fetid smell. *Leaves* .2-.4 in. linear oblong, rather thick. *Cymes* few flowered, lax. *Sepals* entire, oblong, .25 in. long. *Petals* marcescent; styles shorter than the ovary. *Capsule* equalling the persistent sepals.

KHASI HILLS, 5-6000 ft.

Flowers spring and summer. Fr. 7 (?) - 10.

FAM. 19. GUTTIFERÆ.

Trees,* rarely shrubs, almost wholly glabrous, generally evergreen and exuding gum-resin of various colours. *Leaves* opposite, entire, usually exstipulate, evergreen, often with close fine parallel nervation. *Flowers* regular, 2-sexual or polygamous, often showy. *Sepals* and *petals* 2-6, imbricate or in decussate pairs, generally concave. *Petals* 2-6, rarely more or 0, usually 4-5, imbricate, or contorted. Male fls.-*stamens* many; filaments free or variously united. Female fls.-*staminodes* many, free or connate. *Ovary* 1-5-12 celled; style usually 1; stigmas as many as cells in the ovary. *Fruit* usually indehiscent, often baccate. *Seeds* large, exalbuminous, cotyledons small and radicle large or cotyledons thick, with a very short radicle.

- I. Style short or 0; stigma large. Ripe fruit pulpy :—
 Ovary 2 or more celled, cells 1-ovuled :—
 Calyx of 4 or 5 sepals. 1. *Garcinia*.
 Ovary usually 2-celled, cells usually 2-ovuled :—
 Calyx enclosed before flowering,
 at length bursting into 2 or
 3 valves or sepals. 2. *Ochrocarpus*.
- II. Style long, slender; stigma small. Ripe
 fruit dr. or pulp fleshy :—
 A. Flowers solitary. Ovary 2-celled,
 cells 2-ovuled. Fruit a capsule. 3. *Mesua*.
 B. Flowers panicled or racemed. Fruit
 drupaceous :—
 Ovary 1-celled with 4 ovules ;
 stigma 4-fid. 4. *Kayea*.
 Ovary 1-celled with 1 ovule .
 stigma peltate. 5. *Calophyllum*.

1. GARCINIA, Linn.

Trees or shrubs exuding yellow or greenish gum-resin ; branches usually opposite, horizontal or pendulous. *Leaves* coriaceous, evergreen. *Flowers* polygamous, solitary or in cymes. *Sepals* and *petals* 4 or 5 each, imbricate. MALE FL. : *Stamens* numerous, free or more generally collected into a 4-5 lobed mass round a pistillode ; anthers 2-celled, rarely 4-celled. FEMALE and 2-SEXUAL FLs. : *Staminodes* or *stamens* 8 or many ; ovary 2-12-celled ; stigma sessile or nearly so, often large and spreading ; ovule 1 in each cell, attached to the inner angle of the cell. *Fruit* pulpy when ripe ; seeds often arillate ; embryo a homogeneous oily mass.

I. Flowers 5 merous :—

Leaves large, oblong-lanceolate with an
 intramarginal nerve.

1. *G. xanthoxygmus*.

I. Flowers 4 merous :—

A. Stigma deeply lobed :—

1. Flowers terminal or axillary, solitary,
 umbelled or fascicled, anthers 2 or
 more celled :—

- a. Middle sized to large trees, flrs. white or yellowish:-
- i. Petioles without fleshy ligules ; stamens in male flrs. collected in a 4 angled mass, fruit over 1'5 in. across :-
 Pedicels moderately stout, fruit obliquely obtuse at the top. .. 2. *G. Coiba*.
 Pedicels stout, fruit with a prominent mamillate protuberance at the top. .. *G. Ksdia*.
 - ii. Petioles with fleshy stem clasping ligules ; stamens in male flrs. in 4 bundles. Fruit under 1'5 in. across. 3. *G. affinis*
- b. A shrub ; flrs. red :-
 Stamens in male flrs. in 4 bundles of 4-5 fruit about 1 in. across. 4. *G. lanceolata*.
2. Flowers from axils of fallen leaves, anthers 1-celled opening transversely, fruit about '7 in. long. 5. *G. Morella*.
3. Male flrs. in short terminal panicles ; stamens in male flrs. in a 4-angled mass, anthers 2-celled ; female flrs. on stout 4-angled peduncles '5-1'6 in. long. Leaves large .. 6. *G. pedunculata*.
- B. Stigma entire:-
1. Bracts not leafy :-
 Male flrs. paniced ; female flrs. in spike-like stout racemes ripe fruit about 1 in. across. 7. *G. paniculata*.
 Male flrs. usually 2 or 3 together on a peduncle, peduncles rarely paniced, female flrs. usually solitary ripe fruit 3 in. across. 8. *G. atrovirens*.
 2. Bracts leafy:
 Flowers in axillary cymes, fruit 1-1'5 in. long. *G. anomala*.

1. *Garcinia xanthochymus*, Hk. f. Vern. *Tepor*, *Tepol-tenga*-Ass. ; *Dephal*, Sylh. ; *Demphal*, *Torloy*, *Tipp.*, *Arnuh*, *Garo* ; *Thesampreng*, *Mikir*, *Dieng-soh-ryu-san*, *Dieng-soh-khyllung*, *Khasi*.

A small or middle sized tree with sombre-green foliage and a deep narrow crown ; branchlets square, and usually sulcate, rather thick, green. *Bark* dark-brown exfoliating in small flakes, white or slightly pinkish inside, exuding pale-green gum. *Leaves* 8-16 by 2-3'5 in., narrowly oblong or oblong-lanceolate, coriaceous, shining on both surfaces ; lateral nerves irregular, almost invisible on green leaves, main about 30 on either half looping into an intramarginal nerve and alternating with as thick but shorter intermediate ones ; midrib stout, rather sharp on the back ; base cuneate ; margins thickened, slightly recurved ; petiole '6-1 in., thick, angled, rugose, with a fleshy ligule at base. *Flowers* pentamerous, dull-white in 4-8 flowered fascicles from axils of fallen leaves on fleshy pedicels. **MALE FLs.**-*Sepals* 5, orbicular, about '16 in. diam. fleshy ; *petals* 5, about twice the size of the sepals, orbicular, thin, veined ; *stamens* in 5 fleshy bundles of 3-5, alternating with 5 fleshy glands ;

anthers 2-celled. **BISEXUAL FLS.**—*sepals* as in the males; *petals* ciliate; *stamens* as in the males. *Ovary* usually 5-celled with a neck supporting a 5-6 lobed spreading stigma. *Fruit* 1.5-2.5 in. diam., pointed, crowned by the persistent stigmatic lobes, green, golden yellow when ripe; seeds oblong.

Fairly common in high evergreen forests where the soil is clayey.

Wood dark-greyish-brown, hard and close-grained, with numerous concentric white bands between the fine but irregular medullary rays; weight about 55 lbs. per c. ft. The fruit is very acid and is eaten raw and cooked.

Fls. 3-5.

Fr. 10-2.

2. *Garcinia Cowa*, Roxb. Vern. *Kau-theke*, *Kungach*, Ass. (also *Kuji-theke*, Ass. being often confused with (*t.* *Kydia*); *Blachung-changne*, Daff.; *Kau*, Sylh.; *Cach*, Manip and Naga; *Khatoksi*, Meeh, *Tekra*, *Rengran*, Garo.

A small or middle-sized tree up to 40 ft. in height with an oval crown and dark green foliage; branchlets terete or slightly 4-gonous. *Bark* brown greyish outside, nearly smooth, or on old trees rough with exfoliating scales, often with large white blotches, inside red, soon turning reddish-brown, exuding a yellow gum. *Leaves* 2-7 by 1-3 in., rather broadly elliptical lanceolate, gradually or abruptly acuminate, cuneate at base, somewhat fleshy when green, drying chartaceous, red to reddish-brown when young; main lateral nerves about 12 on either side, arcuate, meeting near the margin; petiole .25-.6 in. long. *Flowers* dioecious, 4-merous, yellow. **MALE FL.**—2-3 in. across in dense terminal or axillary clusters; pedicels up to .35 in. long, rather stout; sepals .15-.25 in. broad ovate or suborbicular, thick, pale yellow, unequal. *Petals* twice as long, oblong brownish; anthers 4-gonous and 4-celled sub-sessile and close-set on a 4-cornered fleshy mass; pistillode minute. **FEMALE FL.**—larger than male flowers, terminal, solitary or more generally 3-5 together, shortly pedicelled; *staminodes* forming an interrupted ring consisting of 5-10 connate filaments round the ovary; stigma spreading into 6-8 crenate lobes. *Fruit* about 2 in. diam., globose but slightly tapering and somewhat oblique towards the apex, dull-red outside and orange inside when ripe, 4-8 seeded, crowned by the persistent stigma.

In all Districts; up to 3000 ft., in the KHASI HILLS.

The acid fruit is eaten and preserved in sun-dried slices in Assamese households for use in dysentery, but is considered to be somewhat inferior in quality to that of *G. Kydia*.

Fls. 3-4.

Fr. 6-8.

Garcinia Kydia, Roxb. Vern. *Kuji-theke*, Ass.; *Hau*, Cach.; *Tarak-asing*, Miri and Abor; *Dieng-sofi-longksan*, Khasi; *Tekra*, *Denga-doti*, Garo; *Chop-chopa*, Ass. (Kamrup).

A glabrous evergreen tree 50-70 ft. in height with a narrow crown and drooping branches. *Bark* dark-brown and smooth outside with a thin cuticle, which peels off easily exposing a red-veined brown surface, blaze pale yellow, .12-.3 in. thick, exuding a yellow gum. *Leaves* 2.5-5 by .8-1.7 in., ovate-oblong to elliptic or oblong-lanceolate, acuminate, very gradually cuneate at the base, coriaceous, glabrous, shining above; lateral nerves very

slender, rather irregular, about 12 on either half, with a few intermediate ones, all arched to form an intramarginal nerve about .08 in. from the edge; petiole 3-4 in. long, slightly dilated at the base. *Flowers* dioecious, yellow, larger and on much thicker pedicels than in the preceding species. *Sepals* 4, 2-2.5 in. long, equal, ovate, fleshy; *petals* thick, about twice the sepals, concave at the base. *MALE FLS.*—in small terminal umbellules; *stamens* numerous, on a fleshy 4-lobed elevated mass; filaments very short; anthers 4-gonous, 4-celled. *FEM. FLS.*: *staminodes* 4, 2-3 cleft with glands at the extremities; *ovary* 6-8 celled; stigma sessile, spreading, irregularly 6-8 lobed, fleshy glandular. *Fruit* about 2 in. diam. globose, depressed at the apex with a mamillate protuberance; seeds straight along the inner face but rounded along the back, covered with a juicy, fleshy, acid aril.

Hardly separable as a species from the last in the herbarium. As it is usually comparatively easily differentiated in the field, it has been tentatively separated.

Fairly common in UPPER ASSAM up to about 2000 ft. except perhaps the N. E. FRONTIER DISTRICT, often cultivated in homesteads for its acid fruit, which is considered as a specific for dysentery also for external application in obstinate cases of headache.

Flrs. 2-4. Fr. 6-8.

3. *Garcinia affinis*, Wall. Vern. *Thekakhaksi*, Garo; *Dieng-soh-kwang-rüt*, Khasi.

A fairly large tree with horizontal branches and grey bark exfoliating in large roundish flakes, blaze pink turning brown, exuding white gum. *Leaves* 4-6.5 by 1.5-3 in., elliptic oblong to oblong lanceolate, shortly blunt acuminate, or subacute, thinly coriaceous (when dry), glabrous, lateral nerves about 18-21 on either half, fine with many intermediate ones, ending in an intramarginal nerve; base subacute or acute; petiole 1-1.6 in. long channelled with a stem clasping fleshy ligule at the base. *MALE FLS.*—75 in. across, yellowish in terminal fascicles of 3-9; buds globose; pedicels 1-3 in. long. *Sepals* and *petals* 4 each, the latter much larger. *Stamens* in 4 short bundles. *FEMALE FLS.*—solitary terminal; ovary 4-celled; stigma divided. *Fruit* nearly globose, mamillate, 1.25 in. across, dark purple, dry crowned by the stigma.

Rongrengiri reserve—GARO HILLS, Rangbynee—KHASI HILLS; SYLHET, Wallich's sheet No. 4254 referred to by Hooker, but of which there is no duplicate at Calcutta. Identification based on incomplete material.

4. *Garcinia lanceifolia*, Roxb. Vern. *Rupohi-theke*, Ass. *Prangsu*, *Prangso-arong*, Mik.; *Shushru-thai*, Kach; *Pelti*, Lushai; *Thisuru*, Garo; *Kengrapel*, *Toiteng*, Kuki; *Dieng-soh-jadu*, Khasi; *Dieng-soh-srit*, Synt.

A handsome glabrous shrub up to 12 ft. in height growing under dense shade of other trees; stem dark-brown, decussately branched. *Leaves* dark glossy-green, 2.5-5 by 1.1-2 in. lanceolate, long-acuminate, rather fleshy when green but drying almost membranous; lateral nerves 8-10 on either side of the midrib, very slender, irregular, meeting close to the margin; base tapering; petiole 1-1.6 in. long, margined. *Flowers* red, terminal, solitary or 2-3 together, bracteate, male about .3 in. across, female on short thick pedicels. *Sepals* 4, 1.5-2 in. long, broadly elliptic; *petals* 4, somewhat shorter and slightly oblique.

Stamens in 4 bundles of 4-5 each; anthers 1-celled. *Ovary* obovoid; stigma 6-8 lobed, glandular-tubercled. *Fruit* obovoid, about 1 in. diam., bright orange-red, 6-8 seeded.

Fairly common in evergreen forests in LAKHIMPUR, SIBSAGAR, CACHAR, NOWGONG, KHASI HILLS up to 3000 ft., GARO HILLS, NAGA HILLS; often cultivated in villages for the fruit.

The leaves are subacid and are eaten cooked by Mikirs. The ripe fruit which is acid is eaten with relish.

Flrs. 2-3.

Fr. 6-7.

5. *Garcinia Morella*, Desr., including *G. elliptica*, Wall. Vern. *Kuji-thekera*, Ass.; *Korbomba*, Kuki; *Sundur-kun*, Sylhet.

A small tree up to about 40 ft. in height. *Bark* dark greyish-brown about 3 in. thick; inside cream-coloured in older trees mottled with dark-brown dots, exuding a yellow gum. *Leaves* 4-6 by 2-3 in.; elliptic to ovate-lanceolate, obtusely acuminate, coriaceous; lateral nerves oblique, irregular, 2-5 in. apart; base cuneate; petiole 3-5 in. long, thickened and shortly ligulate at the base. **MALE FLS.**: generally 3 together, in axils of fallen leaves, very shortly pedicelled, about 3 in. across. *Sepals* and *petals* orbicular, the latter somewhat larger. *Stamens* on a 4-angled fleshy mass; anthers orbicular, shortly stalked, flattened, circumsciss. **FEMALE FL.** larger than male, solitary, subsessile; staminodes about 12, the filaments forming a ring round the ovary. *Ovary* globose; *stigma* sessile, round or 4-lobed, tubercled. *Fruit* about 7 in. diam. globose or slightly elongate, seated on the persistent sepals and crowned by the imperfectly 4-lobed stigma, yellow when ripe. *Seeds* 1, slightly compressed; testa dark-brown, slightly muricate.

Jaipur forests, LAKHIMPUR: Bhalukpong, DARRANG: Bhutan Hills, Barak Line Reserve, CACHAR; SYLHET: KHASI & JAINTHIA HILLS—Hooker, probably also the vicinity of MIKIR HILLS.

Wood yellow, fairly hard, mottled, with numerous wavy concentric bands; medullary rays moderately broad; weight about 56 lbs. per c. ft. The gum resin is the true gamboge which is useful as a dye and medicine, but its use is not known in Assam. The seed yields a fatty oil which can be used for illuminating purposes also as a substitute for ghi.

There seem to be two varieties of this tree, the leaves of the one having closer and more transverse lateral nerves than of the other. There are no doubt other differences also, but materials at hand are not sufficient to enable me to define them.

Flrs. 12-2.

Fr. 5-6.

6. *Garcinia pedunculata*, Roxb. Vern. *Bor-thekera*, Ass; *Tabing-asing*, Miri & Abor; *ampri-arong*, Mik.; *Thaipomlien*, Lushai; *Soh-lyntraw*, *Dieng-soh-danei*, Khasi.

A fairly large tree up to 60 ft. in height with a fluted trunk and rather short spreading branches. *Bark* thick, spongy; nearly smooth and dark-brown or dark grey outside, pale-brown inside with a network of very fine red lines; gum scanty and slow to exude. *Leaves* 6-12 by 3-5.5 in., obovate or oblanceolate, rigid, subcoriaceous, midrib stout; lateral nerves 3-5 in. apart,

arched so as to be tangential* to the margins, tertiaries very fine, about .08 in. apart, transverse to the secondary nerves; base cuneate; petiole 1-1.5 in. long. MALE FLS.—pale green in few-flowered terminal panicles and on stiff pedicels 2-3 in. long, each with a pair of bracts a little above the base; sepals .3 in. across, orbicular, fleshy; petals slightly longer than the sepals but narrower; stamens numerous in a 4-cornered mass; anthers 2-celled but 4-angled. FEMALE FLS. solitary, larger than male, terminal on a thick 4-angled peduncle, which is .5-1.6 in. long; staminodes 20-30 in 4 bundles, which are connate below; stigma peltate, spreading, about 10-lobed. Fruit globose 3-4.5 in. diam., fleshy; seeds 8-10, reniform, enclosed in a fleshy aril.

Occurs sporadically throughout UPPER ASSAM up to 3000 ft

The acid fruit is eaten raw or cooked.

Fls. 9-4. Fr. 12-2.

7. *Garcinia paniculata*, Roxb. Vern. *Sochopa-tenga*, Ass.; *Thisru*; *Garo*; *Bombs*, Tipp.; *Bombhathei*, Lushai; *Bombathing*, Kuki; *Dieng-soh-jadu*, *Dieng-soh-longkor*, *Dieng-soh-longkydu*, Khasi.

A handsome dioecious evergreen tree up to 60 ft. in height and 4 ft. in girth, with oval crown and decussate branches. Bark dark-brown or brownish grey and nearly smooth outside, about .3 in. thick; inside pink with fine veins of deep red, soon turning deep reddish brown, exuding a yellow gum. Leaves 4-7.5 by 2-3.5 in. obovate, elliptic or oblanceolate, suddenly bluntly acuminate, cuneate at the base, subcoriaceous, smooth and shining on both surfaces; lateral nerves 8-12 on either half, arched and vanishing near the margin without forming a continuous intramarginal nerve; tertiaries very fine, transverse, subparallel, .1-1.2 in. apart; petiole .6-.9 in. long, stout, slightly dilated at the base. MALE FLS.—dull-white, very sweet-scented, about .5 in. diam. in decussately branched conical terminal panicles 3-5 in. long, with angled branches; sepals and petals 1 each, decussate, imbricate; stamens numerous on an elevated glandular receptacle. FEMALE FLS.—larger, sessile or on very short pedicels in few flowered peduncled terminal spike-like racemes, which are sometimes shortly branched at the base; ovary oval; stigma sessile, convex, entire, tubercled with minute glands. Fruit about 1 in. long, globose or slightly elongate, crowned by the hemispherical granular stigma; seeds generally 4, enclosed in a pulpy aril.

Holongapar, Naga janka, Garampani, etc. in SIBSAGAR; CACHAR, KHASI and JANTIA HILLS up to 3000 ft., LUSHAI HILLS, GARO HILLS, NAGA HILLS.

Wood moderately hard, greyish-brown with closely packed wavy concentric bands; pores scanty, fairly large; medullary rays of three grades, of the last grade very fine and close. It is liable to split. Weight about 40 lbs. per cu. ft. The ripe fruit is eaten with much relish.

Fls. 12-2.

Fr. 5-7.

8. *Garcinia atroviridis*, Griff.

A graceful tree up to 50 ft. in height; branchlets terete smooth, thick; bark blackish. *Leaves* 6-9 by 2-3 in. oblong-lanceolate, abruptly acute at the apex, contracted at the base, thickly coriaceous, glabrous, shining both above and beneath; lateral nerves about 50 on either half (about 12-16 in. apart), anastomosing along the margin, inconspicuous when green, prominent when dry; petiole 5-1 in. long, reddish. **MALE FLs.** about 6 in. across, 2, less often 3 together; peduncles up to 7 in. long, sometimes panicled; *sepals* 4, the two outer smaller, orbicular, concave, streaked with red inside; petals similar to inner petals, deep-red, concave; stamens united into a ring. **FEMALE FLs.**—terminal, usually solitary, about 1.5 in. across; peduncle 1 in. long; *staminodes* in a discontinuous wavy ring round the ovary; *ovary* vertically ribbed, 10-16 celled; stigma umbrella-shaped, entire, broader than the ovary, fleshy, blood-red, entire but wavy at the margin. *Ripe fruit* 3 in. across, globose, yellowish-green, slightly lobed at the base, crowned by the sessile stigma, which then becomes concave.

This tree occurs in the N I FRONTIER DISTRICT Not yet met with in the other DISTRICTS.

The fruit is edible

9. *Garcinia anomala*, Planch. Vern. *Itubung*, Manipur; *Thechu*, Garo; *Dung-soh-kuang*, *Soh-lain-lhlaw*, Kh.; *Dung-sa-slung*, *Dung-soh-lang-sam*, Synt.

A small tree, with brown or grey rough bark about 12 in. thick; blaze yellowish or very light pinkish white, very finely fibrous, exuding yellowish gum. *Leaves* 3.5-8 by 1.5-1 in. elliptic to oblong lanceolate, shortly blunt acuminate, coriaceous; lateral nerves fine about 16-27 on either side, with many intermediate ones, anastomosing near the margin, joined by fine tertiaries, often nearly at right angles; base cuneate, subacute or rounded; petiole 5-7.5 in. long, channelled; base with a fleshy sheathing ligule. *Flowers* in 3-flowered axillary cymes supported by opposite leafy bracts 3-5 in. long, peduncles up to 1 in. long, bracteoles opposite, caducous, up to 1 in. long, more or less concave. **MALE FLs.** *sepals* 1, 3 in. long, suborbicular, concave. *Petals* 1, yellowish-white, obovate-oblong, slightly oblique, 5 in. long. *Stamens* numerous, surrounding and concealing the pistillode; anthers forming a globose mass dehiscing longitudinally. **FEMALE FLs.**—6 in. across, *sepals* and petals smaller than in the male flrs., otherwise similar. *Staminodes* connate at the base, shorter than the ovary. *Ovary* oblong; stigma expanded, edges revolute. *Fruit* 1-celled, supported by the more or less persistent recurved sepals, 1-1.5 in. long, subglobose or ovoid, with a short thickened style.

Damra Reserve, GARO HILLS, NAGA HILLS, KHASI & JAINTHIA HILLS, 3000-5000 ft.

Flrs. 11. Fr. 11-2 (?)

* *Garcinia spicata*, Hk. f. Vern. *Dingso Kwang*, Khasi.

A middle sized tree (70' 159"). *Bark* brown, about '5 in. thick, pale inside. *Branches* angular. *Leaves* 5-8 by 2.5-3 in., broadly elliptic or elliptic oblong, acute, coriaceous, glabrous; lateral nerves numerous, slender, transverse nervules oblique; base acute or obtuse; petiole '4-6 in. long, transversely rugose. *Flowers* 5-merous, in fascicles, frequently lengthening out to spiciform racemes; males sometimes mixed with females in the same fascicles. *Ovary* 3-4-celled, ovoid. *Fruit* green, subglobose, beaked.

Sheet No. 3036 (U. N. Kanjilal) is identified at Sibpur Herbarium (Royal Botanic Garden) as *G. ovalifolia*, Hk. f. — *Garcinia spicata*, Hk. f. I have followed Brandis in accepting the older name. This is a new record in Assam.

Fruit is eaten.

Fls. Hot season.

Fr. Cold season.

Imperfectly known species:—

1. *Garcinia* sp., Vern. *Tempor*, Ass. A tree generally resembling *G. xanthochymus*, but taller. *Bark* dark brown, exfoliating in large flakes, thin, red inside, changing to dark brown, resin at first white, then yellow. *Branchlets* sulcate, swollen at the nodes. *Leaves* 6-8 by 2.5-3 in. ovate lanceolate, elliptic, or oblong, short acuminate or obtuse; base subacute or broadly cuneate, coriaceous, shining, main lateral nerves about 15-22 on either half, meeting near the margin, with many intermediate ones between; petiole '5-1'2 in. stout, laterally angled, rugose with fine horizontal wrinkles, and with a fleshy stem-clasping ligule at the base. *Flowers* white, 4-merous, monœcious. MALE FLRS.—about 1'2 in. across; sepals coriaceous orbicular or broader than long '5-6 in. across, two outer a little larger. *Petals* 4, subequal a little larger than the sepals. *Staminal* mass 4 lobed; filaments many, very short, anthers 2-lobed, dehiscing vertically. FEMALE FLOWERS—a little smaller than the male flowers about '9 in. across; stigma indistinctly and rather irregularly lobed, smooth, edges recurved. *Fruit* not seen.

Sheet No. 3632 Rajgarali—LAKHIMPUR.

Flrs. 5.

2. *Garcinia* sp.—A small tree upto 35 ft. in height with a narrow crown and slender branchlets, young shoots red. *Bark* dark brown or black about '1 in. thick exuding yellow gum. *Leaves* 3-4 by 1-1'7 in. lanceolate or oblong to elliptic-lanceolate, acuminate, thick and fleshy when green, drying thin glabrous, shining above, glaucous beneath; lateral nerves fine, rather indistinct, upto about 18 in each half with many intermediate ones, usually joining close to the margin to form an intermarginal nerve, *tertiaries* very fine, oblique more or less wavy or subparallel; base acute, narrowed to the short, ('2-3 in. long) channelled petiole. *Flowers* 4-merous, axillary or terminal, solitary or 2-3 together. MALE FLRS.: small on stout pedicels about '25 in. long; bracts opposite, small. *Sepals* '05 in. long, ovate. *Petals* imbricate in bud, orbicular, about '1 in. long. *Stamens* in 4 erect bundles joined at the base, round a pistillode with an expanded rugose stigma; staminal bundles adnate and opposite to the petals; anthers many, almost sessile, 4-celled. FEMALE FLRS. not seen.

Longai Reserve, SYLHET, evergreen forest in SYLHET and possibly in other Districts. Sheets Nos. 4942 and 6897.

Wood coarse fibred, perishable.

Flrs. 4.

2. OCHROCARPUS, Thouars.

Trees. *Leaves* opposite or ternately whorled, coriaceous. *Flowers* polygamous in short cymes or lateral or axillary fascicles. *Calyx* entirely closed at first, at length splitting into 2, sometimes 3 valves or sepals. *Petals* 4 or more. *Stamens* indefinite; filaments filiform, free or shortly connate at the base; anthers erect oblong or linear, dehiscing longitudinally. *Ovary* usually 2-celled; ovules usually 2 in each cell; style short, stout, or () ; stigma 3-lobed. *Berry* 1-4-seeded. *Seeds*

large, enclosed in pulp; embryo of a large fleshy tigellus with the cotyledons reduced to a small mamilla or O.

Flowers in dense fascicles:—

Pedicels thickened upwards .5-.75 in. long:—

Fruit 1 in. long, obliquely ovoid. 1. *O. longifolius*.

Flowers solitary or in few fld. lax fascicles:—

Pedicels slender 1-2 in. long:—

Fruit 1.25 in. long, ovoid. 2. *O. siamensis*.

1. **Ochrocarpus longifolius**, Benth. & Hook. f. ex T. Anders. Vern. *Suklong*, Lushai,

A small or large tree with dense deep green foliage; young shoots obscurely angled. *Bark* greyish brown, inside reddish, turning brown, exuding milky sap. *Leaves* 5-7 by 1-2 in., oblong lanceolate, usually acute or bluntly pointed, firmly coriaceous, quite glabrous, midrib prominent, veins elegantly reticulated; base obtuse; petiole stout, about .3 in. long. *Flowers* .6 in. across, in dense short fascicles, in axils of fallen leaves or on old wood. *Buds* globose, orange red; pedicels .5-.75 in. long, thickened upwards; bracts numerous, subulate. *Calyx* reflexed during flowering. *Petals* white streaked with red, ovate oblong, acute deciduous. *Stamens* sterile in female flowers; style short, stout; stigma broad, peltate. *Fruit* 1 in. long, obliquely ovoid, tipped by the hard pointed style.

LUSHAI HILLS (A fragmentary specimen was collected here and identified as above in the Calcutta Herbarium).

The flower buds have commercial importances and are used for dyeing silk.

Fls. Hot season. Frt. Rainy season.

2. **Ochrocarpus siamensis**, T. Anders.

A middle-sized evergreen tree, glabrous. *Leaves* 8-10 by 1.5-2.3 in., oblong or oblong lanceolate, entire, obtuse, coriaceous, glabrous, midrib prominent, reticulated; base narrowed into a thick petiole .3-.5 in. long. *Flowers* fragrant, white, solitary or laxly fascicled; pedicels slender 1-2 in. long; sepals 2, herbaceous. *Petals* broadly oblong lanceolate, blunt or rounded at the tip. *Fruit* ovoid, mucronate, 1.25 in. long, glabrous.

LUSHAI HILLS (B. C. Sen Gupta).

Fls. Hot season. Frt. Rainy season.

3. MESUA, Linn.

Mesua ferrea, Linn. Vern. *Nahor*, Ass. & Miri; *Inji* or *Inji-asing*, Abor; *Micharne* or *Phikcharne-arong*, Mik.; *Khung-khari-luphang*, Kach.; *Ngai-ching*, Naga; *Nageswar*, Sans.; Sylh & Cach.; *Karai*, Khindi, Garo; *Khersei*, Tipp.; *Nasser-bippang*, Mech; *Khersei*, Kuki; *Herse*, Lushai; *Uthan*, Manip.; *Dieng-ngai*, Khasi.

A pre-eminently evergreen middle-sized handsome tree with a dense conical crown in pole stage. *Bark* grey and smooth but generally warty in young trees, afterwards dark-brown or cinnamon, exfoliating in large white flakes, which expose a warty reddish

brown inner surface, coarsely fibrous and red inside, exuding an aromatic oleo-resin. *Leaves* opposite, decussate, very variable, 2.5-7 by .5-2 in., lanceolate or narrowly elliptic-oblong, bluntly long-acuminate, rounded at base on young plants, gradually more acute with age, thinly but rigidly coriaceous, glabrous, shining above, generally covered with a wax-like white powder underneath, red when young and tender, persisting for at least two years; lateral nerves very fine, almost invisible, straight, nearly parallel, sub-transverse; petiole, 2.5 in long, slightly channelled. *Flowers* solitary, generally terminal, sometimes axillary, 1.5-3 in. across, very fragrant; peduncles rusty-tomentose, 3-6 in. long. *Sepals* 5-6 in. long, 4 in 2 pairs, imbricate, thick but with sharp margins, concave, velvety-puberulous outside, persistent. *Petals* 1, pure-white, much exceeding the sepals, cuneate, obovate or obovate, curled and erose at the margins, very finely brown or purple-veined, caducous. *Stamens* very many, forming a globose yellow mass in the centre of the flower; filaments very slender; anthers golden-yellow, linear, 1-12 in. long. *Ovary* ovoid, 2-celled, with 2 ovules in each cell; style long; stigma peltate. *Fruit* 1' 2-1.6 in. across, ovoid, pointed, 1-celled 1-1 seeded, supported by the persistent sepals. *Seeds* variously faceted according to their number in each capsule, with a dark-brown shining horny testa; cotyledons fleshy, oily pale-yellow; radicle inferior.

Common and generally gregarious in almost all evergreen forests in UPPER ASSAM, where the ground is more or less hilly. Does best on well-drained shingly soil with an admixture of red clay. Goes up to 3000 ft in the MIKIR HILLS. Thrives best in a locality with heavy rainfall and humid atmosphere. Much cultivated in gardens and avenues.

Seedlings and saplings and even small poles stand shade very well. Gregarious flowering takes place every third or fourth year and flowering trees do not put forth new leaves, at any rate not till September following.

Sapwood white. Heartwood dark-red, very hard and very heavy (about 75 lbs. per c. ft.). Pores of moderate size, not numerous, generally in radial and oblique strings of 2-5. Medullary rays extremely fine and numerous, uniform and equidistant with numerous wavy concentric lines of lighter tissue. Annual rings indistinct. The timber, though hard and strong, is not very durable being subject to dry rot. It is, however, much used as house posts and piles, also railway sleepers. The flowers are used medicinally and an essence is often extracted from them. The oleo-resin which can be tapped from the trees may be used for varnish. The seeds contain fatty oil which has been found excellent for soap-making. Strung with thin stripes of bamboo they are often used as candles which burn steadily with a reddish light but give a heavy smoke. About 150-200 seeds weigh 1 lb.

New leaves 2-5, and occasionally 9-10.

Firs. 4-5. Fr. 8-10.

4. KAYEA, Wall.

Trees. *Leaves* opposite. *Flowers* hermaphrodite, solitary or paniced. *Sepals* and *Petals* 4 each, imbricate; stamens numerous; filaments slender, free or connate at the base; anthers small, subglobose, 2-celled with vertical dehiscence. *Ovary* 1-celled; style slender, terminated by a 1-cleft stigma; ovules 4, erect. *Fruit* subdrupaceous, indehiscent, 1-1 seeded. *Seeds* with crustaceous testa.

Leaves narrow-oblong or narrowly lanceolate

5-10 in. long ; -

Flowers 1 in. across, panicle branches lax.

... 1. *K. floribunda*.

Leaves ovate-to elliptic-lanceolate, 3-5.5 in.

long ; -

Flowers .3 in. across ; panicle branches short.

... 2. *K. assamica*.

1. *Kaya floribunda*, Wall. Vern. *Kasukorol*, Karol, Cachar ; *Darchong-khab*, *Serpai*, Kuki ; *Phai-hershei*, Tipp. ; *Bolung*, Garo.

A large tall evergreen tree with greenish-grey or brown bark with faint horizontal wrinkles exfoliating in round scales, 15-25 in. in. thick, blaze light pink, or pinkish brown, finely fibrous, sometimes exuding yellowish gum ; all parts glabrous. *Leaves* 5-10 by 1.8-2.5 in., narrowly oblong to lanceolate, acuminate, coriaceous, glabrous, green on both surfaces, pellucid dotted at least when dry ; main lateral nerves about 20-30 on either half, arched and meeting near the margins almost regularly alternating with intermediate nerves, which in their turn alternate with finer ones running about half way up, prominent on the undersurface ; base acute cuneate or rounded ; petiole .5-.7 in. long. *Flowers* white about an inch across on terminal panicles ; bracts and bracteoles small, opposite, deciduous, the former at the base of panicle branches, the latter at the base of pedicels ; pedicels .25-.3 in. long. *Sepals* .3 in long or broad suborbicular, broader than long, accrescent in fruit. *Petals* about .4 in. long, white, with pink edges oblong-obovate or obovate. *Anthers* golden yellow. *Fruits* indehiscent dry, almost encased within the hardened, rugose sepals -- and at this stage -- connate sepals, and tipped by the style ; depressed globose or transversely ellipsoid, 1.5-1.75 in. across, 1-2 seeded. *Sepals* with reddish brown smooth testa.

CACHAR, Bhutan Hill, Sonai reserve ; Lallacherra ; Katakhil reserve ; SYLIET, GARO HILLS, KILASI HILLS ; ascending to 3000 ft.

Wood heavy, pores distant, but rather large, medullary rays fine with concentric bands of soft tissue across the rays giving them a superficial resemblance to annual rings. The timber is used for dugouts and construction

Flrs. 3.

Fr. 5.

2. *Kaya assamica*, King & Prain. Ind. For. xvii, 61.- Vern. *Sia-nahor*, Ass. (Lakh).

A slow growing tall handsome evergreen tree much resembling Nahor in general habit ; branches terete yellowish. *Bark* light brownish-grey, often exfoliating in large square plates ; inside fibrous, reddish with fine and close whitish veins, soon turning brown. *Leaves* 3-5.5 by 1-1.8 in., ovate or elliptic-lanceolate, shortly acuminate and often very finely mucronate, cuneate at the base, firmly coriaceous, somewhat shining above, dull underneath ; lateral nerves arched, almost regularly of three grades, the main ones .25-.6 in. apart and looping to form an uneven intermarginal vein, those of the last grade disappearing about halfway between the midrib and the margin ; petiole slender, .4-.9 in. long. *Flowers* white, about .3 in. across in

terminal or axillary fascicled panicles 3-6 in. long with short, decussate, slender glabrous, bracteate branches; pedicels in flower very slender, 1-2 in. long, much enlarged and thickened in fruit, bracteolate; bracts and bracteoles small, opposite, caducous, buds globose about .08 in. diam. *Sepals* 4, in 2 pairs, imbricate, the outer about .15 in. diam., orbicular, inner spatulate, both much enlarged in fruit so as to completely envelope it. *Petals* 4, white, about 1 in. long, sub-orbicular, thin. *Stamens* numerous, longer than the sepals; filaments free, capillary; anthers small, globose. *Ovary* 1-celled; style slender; stigma 4-fid; ovules 4, erect. *Fruit* depressed globose, scarcely 1 in. long but about 1.8 in. in diam., entirely or almost entirely enveloped by the accrescent hard sepals. *Seeds* solitary, globose but very depressed, 1-1.3 in. diam.; testa reddish-brown, crustaceous, smooth; cotyledons fleshy.

The above description has been based on actual specimens and differs in some points from that given by the authors in the Indian Forester, notably as regards the fruit.

This tree occurs only along the foot of the Himalayas in the NORTH LAKHIMPUR SUB-DIVISION.

Heartwood red at first, turning to dark-chestnut, hard, even-grained, weighing about 60 lbs. per c. ft. Annual rings generally narrow, sharply separated by a thin band of softer tissue. Pores of moderate size, irregularly but uniformly scattered, often filled with resin. Medullary rays very fine but not so close as in Nahr, the distance between them being about equal to the transverse diameter of the pores, uniform, fairly equidistant. Sapwood of a lighter brown. The timber is much valued for construction in the North Lakhimpur Sub-Division. The fruit is used for poisoning fish.

Flrs. 4-5.

Fr. 2-4.

5. CALOPHYLLUM, Linn.

Calophyllum polyanthum, Wall. Vern. Telo. Cach. *Scutebel*, Kuki; *Dieng-la-Karu*, Khasi.

A medium-sized to large evergreen glabrous tree. Bark grey or brown, sometimes almost black when covered with lichens, about .3 in. thick, somewhat rough, exfoliating in oblong flakes, blaze red or reddish brown with whitish bands exuding an amber coloured aromatic gum. *Branchlets* 4-angled, compressed. *Leaves* 2.5-4.5 in., oblong elliptic or ovate-lanceolate, bluntish acuminate, margins undulate, slightly recurved, coriaceous; lateral nerves sub-transverse, very close, parallel; base acute or cuneate, narrowed into the margined petiole, which is .25-.5 in. long. *Flowers* about .2-.3 in. across, polygamous, 4-merous in many flowered, long, simple or branched racemes from the upper leaf axils, usually exceeding the leaves and on terminal panicles; pedicels slender, .15-.2 in. long. *Sepals* unequal, outer suborbicular, small, inner petaloid, longer. *Petals* rather longer than inner sepals, obovate, reflexed. *Stamens* very many; filaments filiform, short; anthers 2-celled.

Ovary 1-celled; style slender; stigma peltate; ovule solitary, erect. *Fruit* a subglobose or ovoid drupe about 1 in. long, crowned by the short style; *seed* egg-shaped, brown.

CACHAR, GARO HILLS—Tura, KHASI & JAINTIA HILLS up to about 2500 ft.. ABOR COUNTRY.

Young leaves are red.

Fls. 2-3. Fr. 12 (?)

FAM. 20. TERNSTRÆMIACEÆ.

Erect or rarely climbing shrubs, or trees. *Leaves* alternate simple, extipulate, usually coriaceous. *Flowers* regular, generally showy and bisexual, usually subtended by a pair of sepal-like bracts. *Sepals* and *Petals* usually 5 each, rarely fewer or more, imbricate the latter often connate at the base. *Stamens* numerous, free or connate at the base, often adnate to the petals. *Ovary* 3-5 celled (many celled in *Actinidia*); styles as many as ovary cells, or if simple, usually with as many divisions; ovules 2-6 or many in each cell, on axile placentas. *Fruit* capsular or baccate; *seeds* few and large, or numerous and small; albumen scanty or 0.

I Peduncles 1-flowered. Erect shrubs or trees:—

A. Flowers 2-sexual, often 1-sexual in (*Ternstroemia japonica*), normally at least 15 in. diam. Seeds few, large:—

1. Fruit indehiscent:—

a. Style simple; anthers basifixed:—

i. Anthers glabrous, ovules 2 in each cell of ovary. ..

ii. Anthers pilose; ovules many in each cell of ovary:—

Ovary 2-3 celled; seeds few.

Ovary usually 5 celled; seeds numerous. ..

b. Styles 5; anthers versatile, glabrous. ...

2. Fruit dehiscent. Styles 3-5; anthers versatile:—

a. Large or medium-sized trees;

seeds winged:—

Capsule globose; seeds reniform winged all round except along the straight ventral edge. ..

Capsule oblong; seeds prolonged upwards into an oblong wing.

b. Shrubs or small trees; seeds not winged. ...

B. Flowers dioecious; scarcely more than 2 in. diam. Anthers basifixed; styles usually 3. Fruit a berry; seeds numerous. ...

1. Ternstroemia.

2. Cleystera.

3. Adinandra.

4. Pyrenaria.

5. Schima.

6. Gordonia.

7. Camellia.

8. Eurya.

- II. Flowers in cymes umbels or panicles, usually not less than '5 in. diam. Anthers versatile :—

1. Fruit pulpy, many seeded :—

Trees or erect shrubs.

Styles 3-5.

2. Climbing shrubs. Styles numerous.

... 9. Saurauja

... 10. Actinidia.

1. TERNSTRÖMIA, Linn.

Ternstroemia Japonica, Thunb. Vern. *Pani-jikiri*, Ass. (Darrang), *Pani-bokul*, Ass (Sibs); *Dieng-la-saw*, Khasi.

A glabrous tree, medium-sized under favourable conditions, but very often stunted to the size of a shrub. Bark grey, warty, blaze light reddish white, soon turning dirty brown, finely fibrous, about '5 in. thick. *Leaves* collected towards the extremities of shoots 2-3 by '7-1'2 in. oblong-obovate, oblong-lanceolate or elliptic, bluntly apiculate or rounded at the apex, gradually narrowed to the '3-5 in. long petiole, entire or minutely crenulate near the apex, coriaceous, dark green above, paler beneath; lateral nerves about 8 on either half, very indistinct. *Flowers* yellowish white, solitary, more or less nodding from axils of fallen or existing leaves, usually dioecious, but sometimes hermaphrodite, '4-6 in. across when fully open, males very sweet scented; peduncles '4-7 in. long with a pair of small broadly ovate bracts below the flower. *Sepals* and *petals* 5 each, subequal, '2-3 in. long, imbricate, connate at the base, orbicular to broadly elliptic oblong, crosso-ciliolate. *Stamens* numerous; filaments short; anthers linear, basifixed, apiculate, glabrous. *Ovary* 2-3 celled; style simple; stigma with 2-3 broad lobes; ovules 2 in each cell, pendulous from the apex. *Fruit* '5-7 in. diam., obovoid-globose, shortly beaked by the remains of the style and supported by the persistent sepals and bracteoles; seed 3-4, red.

A native of the hills, but often found in marshy localities in the plains. e. g., Borjan in LAKHIMPUR; the Diroi Reserve in SIBSAGAR; Chengelmaia and Charduar in DARRANG, NAGA HILLS, etc

Flowers 4-6. Fr. 9-11.

Two varieties of this tree seem to occur in our area :—

1. With larger and flowers crowded on short thick angled subpatent peduncles.
2. With smaller, more distant flowers on slender terete nodding peduncles. The former is the one commonly found in the Khasi Hills and latter is the variety that generally represents the tree in the plains.

2. CLEYERA, DC.

Trees or shrubs. *Flowers* small solitary on axillary peduncles which are often fascicled; bracts minute or 0. *Sepals* 5. *Petals* 5, more or less connate at the base, much exceeding the petals. *Stamens* many; anthers pilose. *Ovary* 2-3-celled; styles simple elongate with a 2-3 fid apex; stigmas slender; ovules many. *Fruit* baccate. *Seeds* usually few.

Peduncles usually fascicled in leaf axils ; bracts
obsolete.

Peduncles usually solitary or in twos in leaf
axils, bracts minute ... 1. *C. ochracea*.*

... 2. *Ç. grandiflora*.

1. *Cleyera ochracea*. DC. Vern. *Pani-bokul*, Ass. (Sibs).

A small tree having a superficial resemblance to *Ternstroemia japonica*. Leaves 2.5-4.5 by 1.7 in. oblong-obovate to oblanceolate, quite entire and with recurved margins, apex subacuminate with a broad blunt tip, cuneate at the base, midrib very stout ; main lateral nerves about 12 on either half, slender, tertiaries also slender, laxly reticulating ; petiole 3-4.5 in. long, flattened, broadly margined. Flowers yellow, .5-.7 in. across, peduncles in axillary fascicles, rarely solitary, .6-.8 in. long, glabrous, thickened upward ; bracts () or obscure. Sepals 5, about .1 in. long, orbicular or broadly ovate, minutely but stiffly ciliate. Petals 5, yellow, .3-.4 in. long, elliptic. Stamens numerous ; filaments longer than the anthers ; anthers with white bristles. Style filiform, persistent. Fruit a berry.

Diroi Reserve in SIBSAGAR ; probably also in the MIKIR HILLS ; lower range of KHASI HILLS.
Fls. 7-8. Fr. 9-11.

2. *Cleyera grandiflora*, H. Kf. & Th. Vern. *Dieng-tic-la-muh*, Khasi.

A small glabrous tree similar to the last but larger in all its parts. Bark dark brown outside, reddish with patches of brown inside. Leaves 3-4 in. (.5 in. according to F. B. I.) elliptic, shortly and often somewhat abruptly blunt acuminate ; base cuneate or acute at the base, coriaceous, midrib stout, lateral nerves indistinct, but apparently over 15 on either side ; petiole 3-5 in. long. Flowers 1 in. across, white, scented. Peduncles rather stout, .6-1 in. long, with 2 minute alternate deciduous bracts towards the top. Sepals 1-1.5 in. long, orbicular or nearly so, ciliate. Petals 4-5 in. long, fleshy, elliptic. Anthers with scattered bristles. Fruit not seen.

KHASI HILLS Rangbyneng, 4,000 ft. (sheet No. 7199). Probably not specifically distinct from *C. ochracea*.

Wood heavy, very fine-grained, reddish-brown, hard.

Flowers 7.

3. ADINANDRA. Jack.

Adinandra Griffithii, Dyer.

A small tree ; bark dark grey and warted outside, brown with streaks of lighter colour inside ; all parts glabrous. Leaves 3-6.5 by 1.25-2 in., oblong elliptic or oblong-lanceolate, somewhat bluntly and often abruptly acuminate ; base narrowed, rounded, acute or cuneate, entire with stiff translucent margin, dark green above, paler beneath, coriaceous ; lateral nerves slender, rather obscure, upto 15 on either side ; petioles 4-6 in. long, stout.

channelled. *Flowers* solitary, white glabrous; peduncles 1-1.5 in. long, thicker upwards, recurved with 2 small bracts at the top. *Sepals* persistent, 3-4 in. long, inner larger, suborbicular to orbicular-obovate. *Petals* 5, about equalling the sepals, connate at the base. *Stamens* many, adnate to the petals, sparingly hairy. *Ovary* 5-celled, glabrous; style joined at the foot, deeply 5-fid, segments linear; ovules many in each cell, pendulous. *Fruit* a many seeded ovoid berry usually crowned by the thickened base of the style, about .8 in. long; *seeds* numerous, exalbuminous.

KHASI HILLS, Mamloo.

Flrs. 4-5.

Fr. 10.

4. PYRENARIA, Bl.

Shrubs or small trees. *Leaves* fairly large, serrate. *Flowers* large, axillary, subsessile. *Sepals* 5, unequal, imbricating, the outermost generally resembling the bracts, the innermost the petals. *Stamens* numerous; filaments adnate to the base of the petals. *Ovary* 5-celled with 2 ovules in each cell; styles 5, free or more or less united. *Fruit* indehiscent, drupe-like; *seeds* without a wing, with a woody testa, exalbuminous.

Leaves and branchlets glabrous;
bracts smaller than and resembling
the sepals.

Leaves beneath and branchlets
pubescent; bracts foliaceous
larger than and very unlike the
sepals.

... 1. *P. barringtoniaefolia*.

... 2. *P. diospyracea*.

1. *Pyrenaria barringtoniaefolia*, Seem. Vern. *Bon-madhuri* (Wild Guava), Ass. (Sibs and Lakh); *Janghali-tajar*, *Janghali-cha*, Ass. (Darrang); *Pala-popul-changue*, Daf.

A shrub up to 20 ft. in height. *Bark* dark grey, with fine vertical fissures, blaze brown or reddish-brown. 1-1.2 in. thick. *Leaves* 7-12 by 2-2.4 in. spatulate or oblanceolate, abruptly cuspidate-acuminate, tapering to a channelled stout petiole .5-.6 in. long, cuspidate-serrate; thinly coriaceous, glabrous, main lateral nerves 10-12 on either half, tertiary ones very openly reticulate; midrib depressed above, very prominent beneath. *Flowers* pale-white, 1.2-1.6 in. diam., axillary, solitary on short, thick, glabrous peduncles about .2 in. long. *Bracts* .1-1.5 in. long; *sepals* .3-.4 in. long; *petals* .5-.7 in. long, all more or less orbicular, grey silky outside, more or less eroso-ciliate. *Stamens* very many forming a yellow mass at the centre of the flower; filaments short, glabrous, connate at the base. *Ovary* silky; styles distinct. *Fruit* 1.5 by 1 in. ovoid, minutely lepidote, 5-celled; stones thin-walled, each with 1-2-seeds; seeds about .5 in. long, ellipsoid, laterally also often partially ventrally, compressed with a hard smooth brown testa.

Early common in the outskirts of evergreen forests in all the DISTRICTS of UPPER ASSAM except perhaps the dryer portions of NOWGONG.
Fls. 4-5. Fr. 12-3.

2. *Pyrenaria diospyricarpa*, Kurz.

A small tree upto 25 ft. in height; young parts densely grey-pubescent. *Bark* dark-brown outside, but red inside. *Leaves* 4.8-5 by 1.5-2.8 in., obovate or oblanceolate, abruptly bluntly-acuminate, cuspidate-serrulate, almost membranous, glabrescent above, finely pubescent especially along the midrib and nerves beneath; main lateral nerves 10-11 on either side of the midrib anastomosing .25-.5 in. away from the margin; tertiaries distant, faint; petiole .25-.3 in. long, pubescent. *Flowers* 1-1.3 in. across, dull white, solitary, axillary, subsessile. *Bracts* green, very unequal, 4-7 in. long, ovate to oblong, pubescent outside. *Sepals* about .4 in. diam., orbicular or obovate coriaceous, very densely silky-pubescent outside. *Petals* about .7 by .4-.5 in., elliptic, thick in the centre with membranous margins, glabrous except on the centre of the back. *Stamens* as in the other species. *Ovary* villous; styles 3, free at the apex. *Drupe* 2-3 by 1.5-2.3 in. cylindrical or slightly obovoid, waxy-yellow, supported by the persistent bracts and sepals.

Nambor and Doyang Reserves, SIBSAGAR, not common. Sheet No. 8951, 1709.

Fls. 11-12. Fr. 1-2.

The above description differs in some respects from Kurz's, flowering and fruiting time is also different. It is a good variety and may turn out on further examination to be a new species.

5. SCHIMA, Reinw.

Evergreen trees. *Leaves* thinly coriaceous. *Flowers* handsome, 2 bracteate; peduncles—1 flowered and axillary or the uppermost in short racemes. *Sepals* 5, subequal. *Petals* 5, much larger, connate at the base, unequal, the outermost concave and more or less hooded, *Stamens* many, adnate to the base of the petals; anthers versatile. *Ovary* 5 rarely 4-6 celled; style simple or slightly lobed at the apex with broad spreading stigma; ovules 2-6 in each cell, attached laterally, subpendulous. *Capsule* woody, depressed, globose, usually tipped by the persistent style, loculicidal with a persistent axis. *Seeds* flat, more or less reniform, winged all round except on the hilum, albumen scanty.

Sepals glabrate outside, outer concave.

petals glabrous except at the base.

Sepals densely woolly outside, outer concave, petals densely silky.

... 1. *S. Wallichii*.

... 2. *S. khasiana*

1. *Schima Wallichii*, Choisy, Vern. Noga-bhe, Ass.; Cheknan-arong, Chingan-arong, Mik., Ingkhia-ching, Naga; Kamsuri or Kamsuri-phang, Kach.; Rangi-Rata, Sylh.; Bonak, Cach.; Guga, Mech; Man-khing, Man-thiang, Kuki, Man-khing-thing, Tipp., Dieng-shyr-ngan. Synt.; Dieng-ngan. Khasi.

II. Flowers erect, sepals deciduous:--

Flowers large : 1-1'25 in. across, stamens 70-80.

... 3. *C. drupifera*.Flowers moderate sized up to '75 in. across,
stamens about 30.... 4. *C. caduca*.

1. *Camellia theifera*. (triff. Syn. *Thea chinensis*, Linn. Vern. *Cha*, *Chah*, Hind & Ass. The tea plant.

A large evergreen shrub with glabrous grey branchlets. *Leaves* 3-6 by 1-2'5 in., obovate, elliptic-oblong or oblanceolate, acute or acuminate, closely serrate or serrulate, usually coriaceous, glabrous above, often slightly pilose along and near the midrib beneath ; main lateral nerves very slender, somewhat transverse, 8-12 on either side of the midrib, arched and forming an intermarginal nerve away from the margin ; petiole '15-'2 in. long, flattened above and slightly margined. *Flowers* white, 1-1'5 in. diam., solitary or a few together ; peduncles very short with 2-3 sepal-like bracte. *Sepals* 5, '1-'12 in. long, orbicular, concave, leathery, ciliate, glabrate, pubescent or silky outside, persistent. *Petals* 5, '5-'7 in., long, broadly obovate, slightly connate at the base, glabrous or puberulous outside. *Stamens* numerous ; filaments glabrous connate at the base also adherent to the base of the petals. *Ovary* 3-5 celled, villous ; styles 3, glabrous, connate beyond the middle. *Capsule* '7-'9 in. diam., 3-cornered, leathery ; seeds generally 1 in each cell, rarely more, globose or faceted, smooth, pale brown.

Extensively cultivated in all the Districts of UPPER ASSAM, also found wild in parts of LAKHIMPUR and SIBSAGAR.

Wood greyish-white or light cinnamon colour, very fine-grained with uniformly distributed numerous pores and very fine close medullary rays. Straight branches of unpruned shrubs make very good walking sticks and tool handles.

Flowers 12-3. Fr. 9-12.

2. *Camellia caudata*, Wall. Vern. *Phulkat*, Ass. (Sibs) ; *Dieng-chi*, *Dieng-fyrnem-synrang*, Khasi ; *Dieng-la-phyrno*, Synt.

A small evergreen tree with a spreading crown ; branchlets grey pubescent. *Bark* very thin, smooth, greyish or reddish-brown, brownish green underneath the membranous outer layer, blaze reddish brown inside. *Leaves* 1'7-3'5 by '6-1'3 in. elliptic-oblong to narrowly oblong-lanceolate, caudate-acuminate, serrulate, membranous glabrous above, except the depressed puberulous midrib, more or less pubescent or pilose beneath, especially along the prominent midrib ; lateral nerves very slender oblique and irregular, 8-12 on either half, anastomosing ; petiole '1-'2 in. long, slender, pubescent. *Flowers* white, faintly scented, about 1 in. diam., solitary or 2-5 together, nodding ; peduncles covered with imbricating bracts throughout. *Bracts* and sepals ovate, silky outside. *Petals* 5, spirally arranged, '3-4 in. long, gradually larger inward, obovate, puberulous or silky towards the apex outside. *Filaments* clothed with spreading silky hairs, outer coherent into a glabrate tube '2-'3 in. long. *Ovary* and style densely white, villous ; the latter slightly

exserted, trifid at the apex, segments linear, glabrous. *Capsule* 1 by .7 in., globose or more or less pointed at both ends 1-seeded, opening stellately.

Frequent in evergreen forests in LAKHIMPUR and SIBSAGAR very common round Garampani and behind Numaligarh ascending KHASI and JAINTIA HILLS up to 5,200 ft.

The wood is yellowish-white, fine and close-grained but somewhat soft and light.

Flrs. 10-11.

3. *Camellia drupifera*, Lour. Syn. C. Kissi, Wall. C. Mastersi, Griff. Vern. *Dieng-tyrnem-bhoi*, Khasi.

A shrub or a small tree. *Bark* grey outside, light red and paler towards the cambium inside; branchlets pubescent, buds silky. *Leaves* 2.5-4.5 by 1-1.6 in., elliptic-oblong, oblong-lanceolate or oblanceolate, acuminate or shortly caudate, tapering at the base to petiole, margins slightly recurved, slightly serrulate or almost entire, coriaceous, glabrous above, pilose or glabrescent beneath; lateral nerves rather indistinct, 8-10 on either side of midrib, forming loops close to the margin; petiole .1-2 in. long when young, glabrate with age. *Flowers* white, 1-1.25 in. across, erect; peduncles terminal and axillary 1-3 together, very short, at first closely invested by the imbricating bracts, ultimately marked with prominent annulate scars; bracts early deciduous, upto .4 in. long, upper larger, suborbicular or broadly ovate, silky tomentose, grading into the sepals. *Sepals* deciduous, up to .3 in. long, suborbicular, silky outside. *Petals* about .7 in. long, obovate, more or less pubescent outside. *Stamens* about 70-80, glabrous, outer connate at the base, inner free. *Ovary* woolly; style with 2-3 fid. hairy towards the base. *Capsule* about 1 in., at first pyriform and pubescent, ultimately globose; seed usually 1 in each cell.

KHASI HILLS 3000-5000 ft., CACHAR HILLS (Prazer), NAGA HILLS, MANIPUR.

Flowers 7-11. Fr. 1-(?)

4. *Camellia caduca*, C. B. Clarke, Mss. Vern. *Dieng-tyrnem*, *Dieng-jih-halich*, Khasi.

A large shrub, somewhat resembling the last species but with smaller leaves of flowers. *Leaves* 1.7-3 by .8-1.2 in. oblong or elliptic lanceolate, acuminate; base cuneate, acute or tapering, usually sharply serrulate or nearly entire, coriaceous, often minutely wrinkled, midrib pubescent, otherwise glabrous above, under surface pilose, specially towards the base and along the midrib or glabrate; lateral nerves obscure, 6-9 on either half, meeting near the margin in loops; petiole .25-.3 in. long. *Flowers* white, scented, erect on short stout peduncles; .6-.75 in. across; peduncles axillary or terminal, 1-4 together; bracts caducous, silky or thinly pubescent, larger upwards, more or less keeled, up to .25 in. long, passing upwards into the sepals and leaving prominent scars on the

peduncles after falling. *Petals* unequal, inner larger up to .5 in. long, obovate, nearly glabrous or slightly pubescent outside. *Stamens* 20-38, glabrous. *Ovary* tomentose; style usually 2-3 fid, hairy towards the base. *Capsule* up to .75 in long, pyriform, pointed at the apex.

KHASI HILLS, 4,500-6,000 ft. ; common.

Fls & Fr. 10-12.

8. EURYA, Thunb.

Shrubs or small trees. *Leaves* 2-stichous, usually serrate, generally shining above. *Flowers* small, generally dull-white, dioecious, in axillary fascicles, rarely solitary with persistent bracteoles. *Sepals* and *Petals* 5 each, imbricate, the latter united at the base. *Stamens* 12-22, from the base of the corolla; anthers basifixed. *Ovary* usually 3-celled with 3 styles which are free or united. *Fruit* a berry containing numerous angular seeds; albumen copious, oily.

Leaves usually serrate :-

Generally shrubby; branchlets angular, usually glabrous. *Sepals* glabrous or glabrate.

Often a middle-sized tree; branchlets terete, pubescent. *Sepals* pubescent

Leaves nearly entire.

.. .. 1. *E. japonica*.

.. .. 2. *E. acuminata*.

.. .. *E. symplocina*.

1. *Eurya japonica*, Thunb. Vern. *Sasen*, Ass., *Marmara*, Ass. (Lakh); *Yabi-changne*, Daff; *Pun-heng-heng*, Jharua; *Chhamist*, Garo; *Dieng-pyrsit*, Khasi.

A very variable shrub of the look of tea-bushes, occasionally a small tree up to 25 ft. in height; branchlets angular, with prominent decurrent lines from both sides of the base of the petioles, usually glabrous. *Bark* thin, dark-brown with lines of lenticels, blaze reddish greenish-white. *Leaves* dark-green, 1-3.5 by .6-1.1 in., elliptic obovate or oblanceolate, tip rounded or subacute, closely serrate, thinly coriaceous, glabrous except the midrib, which is hairy underneath; main lateral nerves somewhat transverse, about 10 on either half; tertiaries reticulate; midrib impressed above, prominent beneath. *Flowers* about .1 in. long, white in fascicles of 2-5 rarely solitary, each with two minute bracteoles, with an unpleasant pungent smell, generally glabrous. *Sepals* unequal, the two outer smaller, suborbicular or broad ovate, obtuse. *Petals* white, about double the sepals, obovate. MALE FLS.—with no sign of pistil; *stamens* 12-15, slightly exserted. FEMALE FLS.—*styles* generally 3, very slender, slightly united in flower, but often nearly to the top in fruit. *Berries* about .15 in. diam., mucronate with the remains of the styles, black and with a pinkish juice when ripe.

MIKIR HILLS and adjoining forests of SIBSAGAR and NOWGONG; Joka and Jaipur Reserves in LAKHIMPUR, not very common in UPPER ASSAM, NAGA HILLS, KHASI HILLS up to 6000 ft.

Fls. & Fr. 6-1; probably throughout the year.

Var. *nilida*, *Korths-Leaves* 1-2.2 by .5-.8 in. narrow elliptic or lanceolate, acute or shortly acuminate; petioles very short; styles united above the middle.

KHASI HILLS.

Var. *pyllanthoides*, *Blum*:—branchlets silky pubescent at the tips. *Leaves* longer than in the type, narrow elliptic, or oblong lanceolate, acuminate styles united.

KHASI HILLS (Griffith).

Eurya japonica, Thunb. Var. *nilida*, *korth-forma* Kanjilali, *Debbarman*, N. f.

A small tree, about 10-15 ft. tall. *Leaves* alternate. 1.5-3.7 by .3-.7 in., very narrow oblong or elliptic linear lanceolate, acute, some acuminate, narrowed towards the base ending in short about .1 in. long petiole, margins distantly somewhat glandular serrate. *Flowers* dioecious, axillary, about .1 in. in diameter.

♂ Flower with 5 sepals, 5 petals, both subequal, glabrous outside, obscurely pubescent inside, caducous. *Stamens* 15; pistillode frequently present. *Ovary* 5-locular; styles -2.

Habitat:—ASSAM, KHASI & JAINTIA HILLS, near Kynshi, 5th October, 1915. U. N. KANJILAL No. 6914; N. CACHAR HILLS, Dchinai Bak, 1500-1600 ft, 25th June 1915, U. N. KANJILAL No. 6780.

2. *Eurya acuminata*, DC. Vern. *Murmura*, Ass. (Sibs); *Theng-hau-jang*, Mik.; *Bon-dousa*, *Bon-sobai*, Mech; *Dieng-lu-pyrshit*, Synt.; *Dieng-shut*, *Dieng-pyrshit-hoh*, Khasi.

A small evergreen tree, sometimes up to 40 ft. in height; branchlets terete, the decurrent ridges, if at all present, not prominent; young parts generally grey-hairy. *Bark* dark-brown and fairly smooth outside, reddish inside, thin. *Leaves* 2-4 by .5-1.4 in. oblong to linear-lanceolate, generally caudate-acuminate, closely crenate serrate, subcoriaceous, glabrous and often shining above, midrib impressed above, prominent and hairy beneath; main lateral nerves about 12 on either half alternating with shorter intermediate ones; base subacute; petiole very short, puberulous. *Flowers* .15-.25 in. long, white with a very heavy unpleasant smell, 2 bracteolate, nodding, up to 8 from the lower leaf axils and 2 or even 1 from the upper. *Sepals* concave, pubescent outside, outer 2 smallest. *Petals* white, alternating with the sepals, .1-2 in. long, much exceeding the sepals. *Stamens* 15-24, shorter than the petals. *Ovary* pubescent; styles 3-5, united beyond the middle in the type, free in var. *euprista*, recurved in fruit. *Capsule* globose, .2 in. across, crowned with the remains of the style. *Seeds* bluntly trigonous.

Fairly common in all the DISTRICTS of UPPER ASSAM, KHASI and JAINTIA HILLS up to 5500 ft., NAGA HILLS.

Arrested shoots with imbricating lanceolate aristate greenish scales or less often reduced leaves, are sometimes formed in the leaf axils.

Fls. 9-11. Fr. 1-6.

Var. *euprista*, *Korths*, Vern. *Gaurchikrai*, Ass.—differs by having broader and more membranous leaves which are more or less pilose beneath and more glossy above, the flowers being usually solitary and the styles 4-5, free both in flower and fruit. Also the *sepals* and *ovary* are glabrous. *Bark* deeper red inside and in thin layers. Grows up to 35 ft. in height. Found at Difulu and the foot of the Tiru Hills, SIBSAGAR also in KHASI HILLS.

Wood reddish brown, soft, even grained with evenly distributed minute pores and very fine medullary rays, weighing about 40 lbs per c. ft. It is very good for fuel.

Var. *Wallichina*, Stend - styles united.

KHASI HILLS, CACHAR.

Eurya trachyacarpa, Korth. - A shrub. *Leaves* resembling those of *E. acuminata*, but narrower, longer tailed, more closely serrate, and more membranous; petiole slender 1 in. long. *Peduncles* slender, glabrous .15 in. long, solitary or 2-3 in a fascicle, each with 2 small bracts. *Sepals* pubescent and styles united to $\frac{2}{3}$ rd their lengths. Hooker records it from Khasi Hills on Griffith's authority. There is no specimen at Calcutta Herbarium.

Eurya symplocina, Bl. - An evergreen tree, with dark grey bark. *Branches* lenticelled; leaf buds silky, narrow lanceolate. *Leaves* 2-4 by 1-1.4 in. elliptic lanceolate, bluntly acuminate, thinly coriaceous, glabrous, or midrib beneath with adpressed pubescence, entire or serrulate above the middle; base cuneate; petiole .15-.2 in. *Flowers* 2 in. diameter, flatter than in *E. acuminata* but with similar unpleasant smell, mostly below the leaves, in 3-4 flowered fascicles from axils of fallen leaves; pedicels .15-.25 in. long, 3 bracteate. *Sepals* unequal, silky outside, more free than in *E. acuminata*. *Petals* .15 by .1 in. elliptic. *Anthems* long; styles united more than half way up. *Fruit* .15 in. diam., with remains of the style at the apex.

No. 6223 from Sehramim, KHASI HILLS. The specimens are rather incomplete for satisfactory determination.

Flowers 11.

9. SAURAUJA, Willd.

Shrubs or small trees generally with strigose or scaly branches. *Leaves* approximate at the ends of branches, generally glabrous above, usually serrate, with prominent parallel lateral nerves. *Flowers* usually 2-sexual, bracteate, in axillary cymes or panicles; bracts remote from the calyx. *Sepals* and *petals* 5, each, much imbricate, the former persistent, the latter more or less united at the base. *Stamens* many; filaments adhering to the base of the corolla; anthers versatile, opening by pores. *Ovary* 3-5 celled; styles as many as cells, free or more or less united; ovules many in each cell, anatropous. *Fruit* a 3-5 locular pulpy berry, rarely dry or subdehiscent; seeds many, small, albuminous.

- I. Flowers under 1 in. diameter; sepals not covered with scales :-

- A. Flowers in long peduncled panicles

6-13 in. long :-

Sepals totally or nearly smooth, young parts covered with ferruginous tomentum and pointed scales mixed. ... 1. *S. napaulensis*.

Sepals densely wooly outside, young parts covered with floccose rusty tomentum. ... 2. *S. Griffithii*

- B. Flowers in solitary or fascicled cymes from axils or axils of fallen leaves :-

Sepals smooth outside :-

Leaves glabrous and satiny underneath, lateral nerves 10-20 on either half, oblique and arched, petiole up to 1 in. Flowers .25 in. across, white, fading to pink. ... 3. *S. Roxburghii*.

Leaves densely mealy rusty puberulous beneath, lateral nerves up to 40 on either half nearly straight; petiole 1-2 in. long. Flowers .7 in. across light pink. ... 4. *S. punduana*.

Leaves rusty tomentose beneath, lateral nerves up to 25 on

either half, oblique and *arched,
minor nerves conspicuous,
underneath; petioles 1-2 in.
long. Flowers 3 in.

across, white turning pink.
All parts clothed with stiff
long rusty or black hairs,
leaves distant, stiff hairs
on the principal and minor
nerves above, more densely
hairy beneath; lateral nerves
15-25 pairs, arched, petioles
5-1 in. long. Flowers 25 in. across ...

.. 5. *S. fasciculata*.

- II. Flowers 1 in. across, sepals densely
covered with sharp pointed scales: -
Peduncles solitary or fascicled from
axils of existing leaves:—

Leaves thinly puberulous or
glabrescent beneath, lateral
nerves up to 30, slightly arched.
Flowers white with a bright
red centre. ...

.. 7. *S. cerea*.

1. *Saurauja napaulensis*, DC.

A small tree with reddish brown bark; young parts covered with broad based acuminate scales and brown scurfy tomentum. *Branchlets* and petioles ultimately tuberculate with the persistent bases of scales. *Leaves* 7-12 by 2.2-6.5 in., elliptic, oblanceolate or oblong lanceolate, acute or short acuminate, serrate, upper surface glabrate, undersurface ferruginous tomentose, sometimes glabrate with age; lateral nerves 25-35 on either half, prominent subparallel, connivent near the margin with the upper, tertiaries fine, base narrowed; petioles 1-2.5 in. long, ultimately tuberculate and glabrate. *Flowers* pink, 5 in. across, in long peduncled lax axillary panicles up to 16 in. long, usually from the ends of the branches; branches up to 3.5 in. long; bracts deciduous, elliptic acute, 1.5 in. long. *Sepals* 1.5-2.5 in. long, broad ovate or suborbicular, obtuse glabrous or slightly pubescent towards the base, edges membranous, persistent. *Petals* broad, exceeding the sepals, marcescent tips recurved, margins fimbriate to about the middle, tube widened below; *stamens* many, free. *Ovary* glabrous; styles 5, radiating, united towards base. *Berries* 3.5 in. across, green, sweetish, subglobose or broad ovoid, 5 lobed, green, mealy inside. *Seeds* reddish brown small.

KHASI HILLS, NAGA HILLS, GARO HILLS, MANIPUR, 2500-3000ft.

The ripe fruit is edible.

Fls. 12-6, Fr. 11-1.

2. *Saurauja Griffithii*, Dyer.

A middle-sized or small tree, bark brown rough vertically fissured, blaze 2.5-3 in. very soft, whitish. *Young* twigs, under-surface of leaves, petioles and inflorescence covered with dense rusty or reddish brown floccose tomentum, specially when young. *Leaves* 10-13.5 by 5-7.5 in. broadly elliptic or obovate, shortly

apiculate or abruptly short acuminate, from the rounded apex. subentire or with distant spinulose teeth, base rounded; lateral nerves 30-35 on either half, tertiaries subparallel near the margin, coriaceous, upper surface glabrous; petioles 1.5-2.5 in. long. *Flowers* 2-3 in. across, in peduncled-much branched axillary panicles up to 13 in. long; peduncles up to 7 in. long, main branches 2-3 in. long; pedicels up to .7 in. long; bracts early deciduous, up to .6 in., ovate or elliptic, lower leafy, bracteoles small, oblong. *Sepals* up to .25 in. suborbicular broad ovate or elliptic, tomentose outside. *Petals* not seen in our specimens. *Styles* 5, combined at the base. Berry 5 grooved, about .3 in. across, tipped by the style and seated in the persistent calyx.

GOALPARA, but usually found in SIKKIM in the hills between 3700 & 5000ft. The old leaves are sometimes glabrate on the undersurface.

Flowers 2-6.

3. **Saurauja Roxburghii**, Wall. *Bon-posola*, Ass. (Lakh & Sibs.), *Pariposola*, *Porbotia-sengunia*, Ass. (Darr.); *Hengunia*, Ass. (N. Lakh); *Chepu-changne*, *Chipung-changne*, Duff, *Nonthler-arong*, Mik., *Tong-bahu*, *Dia-ching*, Naga; *Bon-loisu-phang*, Kach; *Gogon*, Nep; *Sing-khrai*, Manip.; *Terpu*, Lushai; *Deibru*, Mech. *Geng-sning*, *Bor-jir-sinung*, Garo. *Arbung-thing* Tipp.; *Dheng-soh-la* pied, Khasi.

A small tree up to 30 ft. in height and 30 in. in girth, generally with a narrow crown; young parts covered with scurfy tomentum and subulate scales. *Bark* grey or greenish-grey and on old stems, corky outside and closely vertically fissured, on branches, green below the cuticle, greenish or pale pinkish-white inside, .3-.5 in. thick, finely fibrous, exuding copious watery sap during spring. *Leaves* 5-12 by 2-4.5 in., elliptic or elliptic oblong, acute or shortly acuminate, subacute or more or less rounded at the base, shallowly serrulate, subcoriaceous, wholly glabrous when mature, pale and with a satiny gloss underneath when green; lateral nerves 10-20 on either half, somewhat distant oblique, arched often rather corky, tertiaries transverse and parallel, quaternaries very minutely reticulate; midrib stout; petioles 1-2 in. long, terete, glabrescent. *Flowers* .25 in. across, urceolate, on shortly peduncled slender fascicled cymes from the axils of fallen leaves; buds globose, about .1 in. in diam.; bracteoles minute. *Petals* ovate, white, fading pink, united at the base, tips recurved. *Stamens* about 50. *Ovary* glabrous; styles usually 5, sometimes 4, united below, but abruptly stellately spreading above. *Berries* whitish, about .2 in. diam., globose.

Common throughout the whole province up to 400 ft.

Wood yellowish when green turning reddish brown, soft, with a large pith pores and medullary rays very fine, very numerous. The leaves are good cattle and buffalo fodder and the ripe fruit is eaten.

Flrs. 3-5. Fr. 5-8.

4. *Saurauja panduana*, Wall. Vern. *Bata-gogon*, Gaban, Nep; *Dieng-ja-la-ngap*, Khasi; *Dieng-soh-la-pat*, Khasi (Nongstoin); *Dieng-sbh-khijut*, Khasi (Nongkhaw); *Dieng-soh-la-pird*, *Dieng-la-kampid*, Synt.

A pretty, small, evergreen tree about 20 ft. in height somewhat of a squat habit and with thin lepidote branchlets. *Bark* brown or brownish grey with large corky lenticels, vertically split on old stems, green underneath the cuticle on branches; inside greenish white changing to brown on exposure, finely fibrous, soft and slightly mucilaginous. *Leaves* 6-12 by 2.5-4.2 in., elliptic obovate or oblanceolate, finely acuminate, cuspidate serrate, coriaceous, glabrous above, finely buff or tan mealy tomentose beneath; lateral nerves 25-40 on either half, reticulating near the margin, on the undersurface, each with 4-6 minute subulate scales at regular intervals, tertiaries transverse or slightly oblique, subparallel, very fine; base cuneate, subacute or abruptly rounded; petioles 1-2 in. long; rather stout, covered with adpressed lanceolate scales. *Cymes* 2-3 in. long, fascicled or solitary from axils of present and fallen leaves; peduncles sometimes flattened, ramifications densely covered with acute scales; bracteoles broadly ovate, pointed. *Flowers* 7 in. across, white, changing to pink; *sepals* 5, thin, glabrous; *ovary* ovoid or globose, glabrous; *styles* 5, united up to varying heights, tips spreading. *Berry* globose, white.

Along the foot of the NAGA HILLS in the LAKHIMPUR and SIRSAGAR DISTRICTS; e.g., the Jaipur and Desai Valley Reserves, also the MIKIR HILLS, GARO HILLS and KHASI HILLS up to 5,000 ft.

Wood light brown, soft, not of any particular use. The ripe fruits are eaten.

Frs. 4-6.

Fr. 9-11.

5. *Saurauja fasciculata*, Wall. Vern. *Sare-gogon*, Nep.

A small tree affecting rocky streams and the vicinity of waterfalls: branchlets covered with densely rusty-tomentose and scattered adpressed scales mixed, bark brown. *Leaves* 6-12 by 1.3-3.2 in., narrow elliptic-oblong, finely acuminate, acute or rounded at the base, setose serrulate, coriaceous, glabrous above, softly and rusty tomentose underneath; lateral nerves 16-30 on either half, arched, looping at the extremities; midrib stout, covered with deciduous adpressed scales; petioles 6-1.4 in. long, terete, covered with scattered scales, ultimately glabrate. *Cymes* up to 3 in. long, peduncled, branches glabrous, 1-3 flowered; bracteoles minute, linear-deltoid. *Flowers* 3 in. across, white, fading to pink; *sepals* ovate, obtuse.

Only once found near Borjan, Makum Forest, LAKHIMPUR
The leaves are eaten by cattle and buffaloes.

Flowering and fruiting time unknown.

6. *Saurauja macrotricha*, Kurz. Vern. *Dieng-soh-jalbi*, *Dieng-soh-lympied*, Khasi.

A small tree clothed with long stiff rusty brown, sometimes almost black hairs. *Leaves* 7-11 by 2-3.4 in. lanceolate or

elliptic-lanceolate, shortly acuminate, bristle serrate, chartaceous, covered with scattered spreading hairs along the midrib and the nerves above, more densely beneath, main lateral nerves 15-25 on either side of midrib, slightly arched and looped near the margin; tertiaries fine; base narrowed; petioles hirsute, usually 5-1 in. long. *Flowers* 25 in. across, fasciculate on slender hirsute cymes from axils of present or fallen leaves, 5-75 in. long; bracts minute, glabrous, lanceolate; pedicels hirsute, 3-6 in. long. *Sepals* 15 in. long, glabrous, elliptic or broad ovate, acute. *Petals* shortly exceeding the sepals, connate at the base, lobes rounded with reflexed tips. *Ovary* glabrous; styles 5, united at the base. *Berries* globose, 2 in. across exceeding the sepals.

Rare, LAKHIMPUR—Namchang, Clarke! Margarita, Prain! KHASI HILLS up to 5000 ft. (Kurz, Clarke)

Firs. 4-6. Fr. 6-8 ?

Saurauja cerea, Griff. Vern. *Porbotu-hengunia*, Ass. (Darr); *Hero-changne*, Daff.

A small tree up to 20 ft. in height; young shoots thick, covered with sharp pointed scales and having a large pith. *Bark* greyish with large lenticels outside, on branches smooth and shining, inside dark brown. *Leaves* 8-18 by 5-7.5 in., broadly cuneate-obovate, abruptly shortly acuminate, acute or rounded at the base, chartaceous, glabrous above, glabrescent and pale beneath; midrib stout, generally sprinkled with adpressed pointed scales; lateral nerves somewhat distant, 18-22 on either half, slender, slightly arched with distant adpressed scales; tertiaries transverse, more or less wavy; petioles 5-1.5 in. long, stout, densely covered with pointed scales. *Flowers* 1 in. across, solitary on short densely scaly peduncles, which are usually fascicled in the axils of fallen leaves. *Sepals* orbicular, densely scaly and tomentose outside. *Petals* united at the base, orbicular obovate, white but with blood red base, waxy. *Ovary* densely villous; styles 5, united and hairy at the base.

Bhalukpung, DARRANG, and possibly in other similar localities along the foot of the HIMALAYAS.

The ripe fruit is eaten.

Firs. 4-5.

10. ACTINIDIA, Lindl.

Actinidia callosa, Lindl. Vern. *Mei-soh-khan*, *Mei-jaior*, Khasi.

A climbing or straggling shrub; branchlets glabrous, lenticelled; bark corky on old stems. *Leaves* 2-6 by 1.2-3 in. ovate-oblong or obovate, finely acuminate, generally cuneate at the base, setosely serrulate, membranous, glabrous, but often with scattered transverse stiff sharp bristles on the midrib above; lateral nerves 8-12 on either half, very oblique and arched, prominent underneath, tertiaries transverse, parallel; petioles 7-2 in. long, slender. *Flowers* whitish, polygamous or dioecious, 5 in. across

in few flowered axillary umbellate cymes; peduncles .3-.7 in. long, generally solitary; pedicels about 1 in. long, slender. *Sepals* and *Petals* 5 each, imbricate, the former .15 in. long, broad ovate, tomentose; petals .2 in. long, obovate. *Stamens* many; anthers versatile, opening by slits. *Ovary* oblong, villous, many-celled; styles clavate, as many as cells in the ovary, elongating and spreading in fruit. *Fruit* up to 1.5 by .7 in. long, ovoid, slightly rugose, buried in soft pulp.

MIKIR HILLS (behind Naharian tea garden), SIBSAGAR District and is likely to occur further inside those hills, also CACHAR (Prazer), LAKHIMPUR-Margarita (Prain), KHASI HILLS up to 5000 ft., MANIPUR and ABOR COUNTRY.

The ripe fruit is acid and is eaten.

Flrs. 4-5. Fr.

FAM. 21. DIPTEROCARPACEÆ.

Resinous tree (in Assam.) *Leaves* alternate, simple, entire, penninerved; stipules small or large, generally fugacious, leaving a transverse scar. *Flowers* regular, 2-sexual, generally sweet scented, in terminal or axillary panicles. *Calyx* gamosepalous, campanulate, free or adnate to the ovary, 5-lobed, 2 or more of the lobes usually accrescent in fruit forming wings. *Petals* 5, twisted, sometimes connate at the base. *Stamens* 5-10-15 or indefinite, hypo- or perigynous, free or connate or adnate to the petals; filaments short, often dilated at the base; anthers 2-celled, connective produced into an appendage above or obtuse. *Ovary* slightly immersed in the torus, usually 3-celled, rarely 2-1 celled; styles fused. *Fruit* nut-like or capsular, usually winged with the variously enlarged calyx-lobes. *Seed* exalbuminous; cotyledons fleshy.

Stipules large, amplexicaul :—

Calyx tube turbinate or urceolate enclosing the ovary but not adnate to it. Fruit with 2 large erect wings.

Stipules small, not amplexicaul :—

Calyx tube short, adnate to the ovary :—

Fruit with 3 large and 2 small erect imbricate wings.

Fruit supported by accrescent subvalvate calyx lobes.

1. Dipterocarpus.

2. Shorea.

3. Vatica.

1. DIPTEROCARPUS, Gaertn.

Tall trees with long cylindrical bole; young parts often stellately hairy. *Leaves* coriaceous, entire or crenate; lateral nerves almost straight and parallel, tertiaries transverse; petiole somewhat swollen at both ends; stipules large, clasping the stem and enclosing the terminal bud, caducous. *Flowers* large, white or

reddish, in few-flowered racemes or panicles. *Calyx* accrescent in fruit, free, 5-lobed, tube turbinate or urceolate. *Petals* spreading, somewhat cohering at base, usually pubescent outside. *Stamens* indefinite; filaments much dilated at the base; anthers linear, connective acuminate or cuspidate. *Ovary* 3-celled with 2 ovules in each cell; style filiform. *Fruit* a woody nut, generally 1-seeded, enclosed in the calyx-tube, with two of the calyx-lobes forming two erect strap-shaped or oblong wings, the other lobes remaining short and forming a crown round the apex of the nut. *Seed* fleshy, cotyledons unequal.

Leaves ciliate on the margins :—

Young parts covered with fasciated bristles :

calyx-lobes erect in flower, pointed.

Young parts velvety tomentose ; calyx lobes reflexed in flower, pointed.

Young parts canescent ; calyx lobes obtuse.

Leaves glabrous :—

Young shoots glabrous.

1. *D. macrocarpus*.

2. *D. Mannii*.

Dipterocarpus sp.

3. *D. turbinatus*.

1. **Dipterocarpus macrocarpus**, Vesque. Syn. *D. pilosus*, *Rarb.* Vern. *Hollong* or *Holong*, Ass.

A very large gregarious tree attaining 150 ft. in height and 12-20 ft. in girth with a long cylindrical bole and a small spherical crown when mature; young shoots and petioles covered with dun-brown fasciated hairs; scars of fallen stipules oblique broad but not very prominent, young twigs compressed. *Bark* pale bluish-grey outside, plain or very nearly so with many large raised warts, reddish-brown inside but yellowish towards the cambium, .7-.9 in. thick. *Leaves* 10-18 by 5.5-9.5 in., elliptic-oblong, shortly acuminate, slightly repand and densely brown-ciliate, with fasciated hairs, membranous, sparsely pilose above when young, glabrous when mature, stellate pubescent beneath, especially along the nerves; lateral nerves oblique, straight, 18-25 on either half, tertiary transverse, subparallel with reticulations between; base rounded; petiole 1.2-2 in.; stipules 3-5 in. long, obliquely set, membranous, densely pilose outside with long fasciated hairs, glabrous but punctate inside with the bases of the outside hairs. *Flowers* usually solitary, axillary, 2.5-3 in. long, pinkish; pedicels .12 in. long, stout, densely grey-puberulous. *Calyx-tube* turbinate, .6 in. long, .5 in. wide at mouth, velvety-puberulous outside, silky-pubescent inside, ordinary lobes 3, deltoid triangular, erect, enlarged lobes strap-shaped, .8-1 by .15-.2 in., coriaceous, velvety plain. *Petals* 5, 2.5-by-6-.8 in., subfalcately oblanceolate, membranous, especially towards the tip and margins, faintly longitudinally nerved, imbricate, twisted generally to the left in bud, glabrate inside, stellately puberulous in close horizontal bands outside except on overlapped parts. *Stamens* about 30; filaments dilated at base, about .12 in. long; anthers oblong, .2-.3 in. long, with a pair of tubercles at the base; arista of connective weakly subulate up to .25 in. long. *Ovary* .25 × .16 in., ovoid, silky pubescent, obscurely longitudinally ribbed; style .6 in. long,

tapering from the top of the ovary, longitudinally ribbed, silky, hairy. *Fruit* 2 by 1.4 in., ovoid, pointed towards both ends, itself densely dun-silky outside, but the encasing calyx-tube is glabrate and minutely punctate with the stellate bases of the fallen hairs. *Unenlarged calyx-lobes* about .8 by .8 in., orbicular-ovate, enlarged lobes 6-9 by 1.5-2 in., puberulous, leathery with three strong main nerves and 1-2 short more or less wavy marginal ones; nervules transverse; radicle apical, erect.

SIBSAGAR, LAKHIMPUR and NAGA HILLS generally on hilly ground, easily recognised from a distance by its towering over the heads of nearly all its associates.

Wood reddish brown, moderately hard; weighing 40-45 lbs. per c. ft., medullary rays conspicuous, straight, fairly equidistant; pores large, unevenly distributed generally in groups of 2 to 3. The timber is much used for house building especially for planking. On account of the resin it contains it is not used for tea boxes although otherwise very suitable.

Flrs. 6-7. Fr. end of cold season.

2. *Dipterocarpus Mannii*, King in herb. Cal. Nov. sp. Vern. *Hollong* or *Holong*, Ass.

A tree as large as the foregoing and growing in the same localities, young shoots stout, nearly terete, softly grey-velvety with slightly oblique prominent scars of fallen stipules. *Bark* pale bluish-grey outside, closely vertically fissured, of a uniform cream colour outside. *Leaves* 7-12 by 4-7 in., elliptic ovate or oblong, shortly but rather finely acuminate, subcoriaceous, plaited parallel to the lateral nerves in bud, repand or shallowly crenate and thinly ciliate along the margins, glabrate above although the midrib is scarcely wholly without hairs, softly stellate pubescent along nerves and nervules beneath; lateral nerves 16-22 on either half, straight and parallel, strong underneath, tertiaries transverse sub-parallel, very fine, close; base rounded, sometimes slightly cordate; petiole 1.3-2 in. long, rather stout, velvety stellate pubescent; stipules 4.5-5 by .7-.85 in., lanceolate, stellately silky-pubescent outside, glabrous and with 13-15 very fine longitudinal nerves inside. *Flowers* pinkish(?), 3 in. long, nearly subsessile in 2-5 flowered axillary panicles. *Calyx-tube* .5 in. long and almost as broad at mouth, velvety-pubescent outside, silky inside; ordinary lobes broadly triangular with a thin and generally recurved margin; wing lobes .7 by .18 in., densely brown-felted. *Petals* 2.2-2 by .45-.52 in., oblanceolate or strap-shaped, membranous, faintly closely nerved, tufted pubescent in transverse wavy bands on exposed parts outside, sparsely puberulous inside, twisted generally to the right in bud. *Stamens* about 25, shorter than in preceding species; filaments scarcely .1 in. long, dilated, weak; anthers about .25 in. long with two basal tubercles, appendage of the connective up to .15 in. long, bristle-like. *Ovary* globose, .15 in. diam., brown-silky, tapering to the style which is .5 in. long or a little longer, longitudinally ribbed, silky. *Fruit* about 1.5 in. long, densely dun-silky outside; the encasing calyx-tube globose with a some-

what constricted neck, ordinary calyx-lobes about .8 in. long, globose, erect but with recurved margins : wings 7-9" by 1.1-1.7 in., with only 3 longitudinal nerves and very completely reticulate nervules.

SIBSAGAR and LAKHIMPUR on hilly grounds or table lands.

The following is an extract from a letter written by Sir D. Prain to Mr. G. Mann probably in 1884, which has been attached to a sheet of flowering specimen of this species collected by the late Babu Kripanath De from the Makum Forest, LAKHIMPUR.

"This is the species sent by you long ago (in F. B. I. page 296 sub *D. pilose notalum videres*). Mr. Clarke has marked on it ? Mekai x x x x x x x. As you now show us it is not Mekai (*Shorea assamica*), x x x x x x x x x x. x x x x x. I was inclined to think this is a very distinct variety of *D. Pilosus*, but Dr. King who has also gone over them with me apropos of your other plants says he would rather look on it as specially distinct and proposes to name it *Dipterocarpus Manni*, King Mss." I have followed Sir J. King in separating this from *D. pilosus*.

Flrs. 6-7. Fr. cold season.

3. *Dipterocarpus turbinatus*, Gaertn. Vern. *Kuroilsal*, (Ach.; *Korjong*, Kuki, *Kherjony*, Tipp. *Kuroil*, Syl. The Gurjun oil tree.

Lofty tree attaining a diameter of about 36 in. with a long cylindrical bole and spreading crown. *Bark* grey or brown rough, vertically fissured, hard, deep brown inside, 1.5 in. thick ; young twigs glabrous or glabrate, stipular scars at first canescent, ultimately glabrate. *Leaves* 5-12 in. long by 2.5-5 in., ovate or ovate-lanceolate, shortly blunt acuminate, sinuate crenate or entire, coriaceous, glabrous on both surfaces ; lateral nerves straight, 12-20 on either half ; base rounded or subcordate ; petiole 1-1.7 in. long, glabrous ; stipules up to about 2 in. long, buff-tomentose, hairs spreading towards the top. *Flowers* 1.2-1.4 in. long, white or pinkish, in few flowered short glabrous racemes from leaf axils of fallen leaves ; pedicels very short. *Calyx-tube* obconic, .3 in. long, glabrous or pruinose, ordinary lobes broadly triangular, acute, very short, wing lobes .3-.5 in. by .1 in. *Petals* softly tomentose on exposed surface, 1-1.2 in. long. *Filaments* very short ; anthers .2-.25 in. long excluding the subulate awn, tubercled at the base. *Ovary* densely pilose, tufted canno-tomentose, tapering to the apex. *Encasing Calyx tube* pruinose, unenlarged lobes .3-.4 by .2-.25 in., obtuse oblong, wings 4-5 by .8-1.4 in., linear oblong, oblanceolate-oblong ; with one prominent nerve and two basal smaller nerves.

SYLHET, CACHAR & GARO HILLS

Kurz calls the form above described *D. lævis*, Hamil.

"Yields a superior quality of wood oil in large quantities and exudes a dirty brown resin"-Kurz. Wood about 49 lbs per. c. ft., tough, moderately hard, heartwood reddish brown, pores large, medullary rays of two class-broad and fine, several of the latter between a pair of the former. Wood is not durable and is subject to attack by shot hole borers and white ants, suitable for packing cases but not suitable for tea chests on account of its resinous contents ; temporary buildings etc. for which its size should recommend its use.

Flrs. 3-4. Fr. 5-6. ?

Imperfectly known species.—

Dipterocarpus sp. near *D. vestitus*, Wall. Cat.—A large tree, "8-10 ft. in girth"—Mann.; young shoots, petiole and inflorescence stellate canescent. *Leaves* 5 by 2.5-3 in. (from a solitary specimen) elliptic or elliptic-oblong, sub-acute, or very shortly obtuse acuminate, margins sinuate crenate, ciliate, coriaceous, midrib above and nerves on the undersurface stellate hairy; lateral nerves 13-17 on either half; base narrowed, obtuse; petiole about 1.2 in. long, stipules brown stellate or fasciculate, tomentose. *Flowers* about 1.7 in. long in short few flowered axillary racemes; pedicel short, stout, up to .2 in. long; calyx-tube about .6 in. long, campanulate or obtusely obconic stellate pubescent outside, glabrous except about the throat within, ordinary lobes obtuse .1-1.5 in. long, wing lobes canno-tomentose, up to .7 in. long, linear oblong. *Petals* twisted to the right in bud, falcate oblong, exposed, surface stellately canno-tomentose about 1.2 in. long. *Stamens* about 35; filaments with dilated base, very short; anthers about .2 in. long, tapering to the subulate appendage of the connective which is about .15 in. long, base shortly two lobed. *Ovary* pilose, ribbed. *Fruit* not seen.

Pathari Hills-SYLHET-Mann. (!)

Firs. 3.

2. SHOREA, Roxb.

Resinous trees, generally of large size. *Leaves* alternate, entire or repand, coriaceous; stipules usually small, caducous. *Flowers* in axillary and terminal lax cyme-bearing panicles; bracts and bracteoles caducous. *Calyx-tube* short, adnate to the torus, segments imbricate, hairy outside, accrescent in fruit. *Petals* imbricate, hairy outside on the exposed portions. *Stamens* 15-50 or more; anther-cells equal, connective usually prolonged into an appendage. *Ovary* 3-celled, cells 2-ovuled; style subulate. *Fruit* fleshy, usually 1-seeded, tightly embraced by the bases of the enlarged sepals which develop into erect wings of unequal lengths, generally 3 long and 2 short; cotyledons fleshy, unequal, one embracing the other; radicle superior.

Leaves ordinarily more than 2 in. in breadth;

flowers small; calyx-segments ovate, .08 in.

long, fruit and wings not glabrous.

... 1. *S. robusta*.

Leaves scarcely more than 2 in. in breadth;

flowers fairly large, calyx-segments

lanceolate .2-3 in. long, fruit and wings

glabrous.

... 2. *S. assamica*.

1. *Shorea robusta*, Gaertn. Vern. *Sal* or *Hul* Ass.; *Hul-crong*, Mik., *Dieng-blei*, Khasi; *Borsal*, *Borsal*, *Borsar*, Garo. The sal tree.

A large tree, deciduous but seldom wholly leafless, with narrow conical crown when young, but with broad spreading crown when mature; young shoots buff-tomentose. *Bark* of young trees blackish-brown, smooth or with a few longitudinal cracks and marked with minute grey specks, of old trees dark-grey, very thick, strongly fibrous, rough with deep irregular furrows, of overmature trees again more or less smooth, dark-brown. *Leaves* at first red or pinkish, afterwards pale-green, mature dark-green, old pale-yellow, drying brown, 4-12 by 2-7 in., ovate-oblong, shortly acuminate, ending in an obtuse point, thinly coriaceous but tough, wholly glabrous and shining when fully mature or the

nerves beneath more or less puberulous ; lateral nerves 12-15 on either half, strong underneath, secondaries slender, transverse, subparallel ; base rounded or slightly cordate ; petiole terete, .5-.8 in. long ; stipules .3-.5 in. long, oblong, slightly falcate, tomentose, caducous. *Flowers* .3-.5 in. long, subsessile, unilateral on racemes 5-10 in. long, arranged in large terminal and axillary panicles, every part of the inflorescence covered with buff tomentum ; bracts caducous, bracteoles minute or wanting. *Calyx-tube* short, adnate to the torus, segments about .1 in. long, ovate, imbricate, shaggy, all accrescent in fruit. *Petals* cream coloured, or yellowish, buff-silky outside, almost glabrous inside, about .5 in. long, tapering upwards, longitudinally 10-12 nerved. *Stamens* up to 50, much shorter than the petals ; filaments swollen at the base ; connective subulate, bearded, minutely trifid at the apex. *Ovary* globose, pubescent ; style subulate. *Fruit* .5 in. long, ovoid, acute, indehiscent, densely canescent ; wings 5, 3 large and 2 small, the largest 3 by .6 in. and the smallest 1.5 by .25 in., spatulate, 10-12 nerved, always more or less pubescent.

The principal timber tree of at least four Districts of this Province, but does not extend east of Nowgong and north of Balipara in Darrang. Two patches evidently artificial, occur in SIBSAGAR, one near Sapokhati and another not far from Khumtai.

The timber is too well known to require a description. A brown dye is sometimes extracted from the bark. The opaline resin is used for caulking boats and is burned for incense. About 350-425 fruits weigh a lb.

New L. and fl. 3-4 Fr. 5-6.

2. *Shorea assamica*, Dyer. Vern. Makai, Mekai or Mekahi, Ass. (Lakhimpur).

A large gregarious tree, 100 ft. or more in height and 8 to 10 ft. in girth, with a cylindrical bole and large crown ; branchlets pendulous, young parts pubescent or puberulous. *Bark* reddish-brown, exfoliating in large overlapping plates, more or less in whorls, inside light-brown in thin layers, exposing darker-brown concentric bands, .7 in. thick. *Leaves* generally 2-4 by 1.2-2 in., ovate and shortly acuminate but on young shoots up to 6 by 2.2 in., oblong lanceolate, tapering and long acuminate, quite entire, thinly coriaceous, glabrous and shining above, at first softly pubescent along the midrib and nerves but afterwards glabrate beneath, midrib prominent beneath, depressed above ; lateral nerves 16-19 on either side, arched, tertiaries faint, transverse, very close ; base rounded ; petiole .3-.4 in. long, pubescent ; stipules 3-6.5 by about .15 in. ovate to lanceolate, finely pointed, strongly 6-8 nerved outside, more or less pubescent, deciduous but not caducous. *Flowers* .5-.6 in. long on short pedicels in axillary or subterminal panicles 3-5 in. long ; bracts caducous ; bracteoles about .08 in. long, shaggy, caducous. *Calyx-tube* very small, segments 5, .2 in. long, lanceolate, canescent outside, pubescent within. *Petals* 5, somewhat unequal, about .5 by .2 in., velvety-pubescent outside where not overlapped, glabrous within. *Stamens* 15, very small, glabrous, adnate to the base of petals ;

filaments .02-.03 in. long, dilated at the base; anthers about .05 in. long, appendage of connective bristle-like, .06-.1 in. long. *Ovary* about .05 in. across, ovoid, somewhat compressed, glabrous or with a few scattered minute hairs, the ridges being almost ciliate; style filiform, about .2 in. long, with a few minute hairs near the base. *Fruit* about .8 by .5 in, glabrous, clasped by the bases of the enlarged calyx-segments; wings linear to spatulate, 2.5-4.5 by .3-.8 in., glabrous, shining, with 6-13 longitudinal nerves and strong and close transverse nervules.

Confined to the Makum Range, LAKHIMPUR & NAGA HILLS. There was a patch of very fine forest of this most handsome tree on the ground now occupied by the town of Margherita. Another patch of good forest occurs in the Jeypur Reserve between Tippam and Namchang. I have never met with it in SIBSAGAR.

Wood light-brown, fine-grained, soft, seasoning well; pores large, single or groups; medullary rays fine and close. Weight 36 lbs. per c ft. It is very suitable for doors, windows, planking and tea boxes.

Flrs. 8-9. Fr. 10-12.

3. VATICA, Linn.

Vatica lanceifolia, Bl. Vern. *Morhat*, Ass. *Mir-kom-phor*, Mik.; *Koyo-asmy*, Abor; *Kalang-asing*, Miri; *Dieng-Lang-Knom*, Khasi; *Dieng-soh-kania*, Khasi (Nongpoh); *Morukur*, Lushai; *Mohal*, Cach; *Moat*, Sylh.; *Mekruk*, Manip.; *Khirkha-champa*, Mech; *Lamukur*, Tipp.; *Kham-khor*, Garo.

A small or middle-sized evergreen tree; young shoots mealy puberulous. *Bark* greenish-grey outside with close horizontal wrinkles, otherwise nearly smooth, inside light greenish-brown, mottled with faint blotches and streaks of lighter colour, compact and hard, .15-.3 in. thick. *Leaves* 4-9 by 1.2-3.5 in., elliptic or oblong-lanceolate, finely acuminate, quite entire, chartaceous, glabrous above, minutely velvety-puberulous or glaucous beneath; lateral nerves 11-15 on either half, slender, arched, tertiaries reticulate; base rounded or sub-acute; petiole .3-.55 in. long, slightly swollen below the insertion of the blade; stipules fugacious up to about .2 in. long, lanceolate or ovate pubescent. *Flowers* white, fragrant, .4-7 in. long, on axillary, solitary or fasciated, pubescent, panicles 2-5 in. long. *Calyx* small, about .1 in. long, velvety-puberulous outside; tube short, adnate to the base of the ovary; segments 5, deltoid-acute, uniformly accrescent in fruit. *Petals* 5, much imbricate, oblanceolate or strap-shaped, puberulous outside where not overlapped, twisted to the right in the cylindrical buds. *Stamens* 15, anther cells somewhat unequal, not contiguous, with a blunt beak at the base, connective flat, tapering to a pointed appendage which is about as long as the anthers. *Ovary* turbinate, puberulous about .08 in. long; style as long as the ovary, somewhat stout, clavate at the apex; stigma 3 toothed. *Fruit* ovoid-globose, .7-1 in. long, brown velvety, supported by thin ovate wings .6 by .4 in.; cotyledons fleshy.

Common in scrubby evergreen forests in all the Districts, excepting the NORTH EAST FRONTIER where it is some-what rare, ascending up to about 3000 ft. Generally very common with a gregarious tendency round swamps.

Wood light brown, compact, with scanty pores and fine medullary rays, but is seldom used except as firewood. It gives excellent charcoal. The clear white resin is used as an incense.

Fls. 4-5. Fr. 7-9.

Vatica Shingkeng, Dunn. Vern. *Shing-keng*, Abor.

A tall tree, glabrous, often gregarious. *Bark* thick, brownish; branches lenticellate. *Leaves* 3.5-7 in. long, alternate, lanceolate, long acuminate or caudate, chartaceous; lateral nerves 6 pairs, ascending; nerve prominent beneath; base rotundate; petiole .24-.4 in. long. *Flowers* not known. *Calyx* outer segments ovate, obtuse, striate, 1-2 in. long; inner .4-.6 in. long. *Fruit* dehiscent very late or not at all dehiscent, 8 in. long, globose, shortly acuminate, seated on the accrescent persistent patent calyx. *Seeds* angular, few.

N. E. F. TRACT (Rengging to Janakmukh).

(Burkill's No. 36254, 36615, 37311 & 37453).

FAM. 22. *ANCISTROCLADACEÆ*.

only Genus.

ANCISTROCLADUS, Wall.

Glabrous scandent shrubs without resin-ducts, branchlets often ending in hooked tendrils. *Leaves* alternate, simple, entire; stipules small, caducous. *Flowers* regular, bisexual, small, in axillary or pseudo-terminal panicles. Calyx-tube ultimately adnate to the ovary, lobes imbricate, unequal, enlarged into wings in fruit. *Petals* 5, contorted, slightly connate at the base. *Stamens* 5-10; filaments short, broad and connate at the base; anthers opening lengthwise, 2-celled. *Ovary* 1-celled; ascending; style thick with three stigmas; ovule solitary. *Fruit* a nut adnate to the tube of the fruiting calyx and surrounded by the wings. *Seeds* globose, with copious albumen, testa often intruding between folds of the embryo; cotyledons folded and enclosing the radicle.

Ancistrocladus Wallichii, Planchon.

A large woody climber, branches thick, angular. *Leaves* crowded at the ends of branches, sessile, 4-16 by 1-3.5 in. oblanceolate, tapering to the sub-auricled base; subcoriaceous, punctate with minute scales on both surfaces, midrib stout, depressed above; lateral nerves rather obscured by reticulations of tertiary nerves a short distance from the midrib. *Flowers* purplish in dichotomously branched, pseudo-terminal panicles shorter than the leaves. *Fruit* pentagonous, turbinate, .4-.3 in. with 5 unequal, veined, glabrous wings 1-2.5 by .15-.8 in. linear oblong to oblanceolate.

SYLHET *De-Silva*, Brandis; Cachar, Brandis, not collected since and there are no specimens at Calcutta from our area.

Fls. 3-4 (7) cold season (Brandis); Fr. 7-9 (7).

Ancistrocladus extensus, Wall? — A strong climber with black stems. *Leaves* up to 17 in by 4 in, oblanceolate, shortly acuminate, tapering to the subauricled base, thinly coriaceous lateral nerves joined by intramarginal veins, obscured by many intermediate tertiary veins prominently reticulated, upper surface punctate with minute scales. *Panicle* repeatedly dichotomous, branches recurved, divaricate. *Wings* unequal, larger, 1.5-1.75 in.

KHASI & JAINTHIA HILLS — elevation about 300 ft

Record based on a leaf specimen which matches with the species in the Calcutta Herbarium

FAM. 23. MALVACEÆ.

Herbs, shrubs or soft wooded trees, young parts mostly covered with stellate hairs; bark with mucilaginous juice and tenacious fibre. *Leaves* alternate, stipulate simple-lobed or digitately compound, usually palminnerved. *Bracteoles* 3 or more, rarely absent, often forming an epicalyx. *Flowers* regular, generally 2-sexual, axillary or terminal, solitary fascicled or cymosely panicle. *Sepals* 5 more or less connate, valvate in bud. *Petals* 5, hypogynous, twistedly imbricate, often adnate to the base of the staminal column. *Stamens* generally indefinite, monadelphous or pentadelphous, anthers 1-celled bursting longitudinally. *Ovary* syncarpous, carpels generally numerous, styles as many as carpels, more or less connate, ovules 1 or more from the inner angle of each cell. *Fruit* capsular or of dry cocci, seeds sometimes with silky tubular hairs (*cotton*) albumen scanty or 0, embryo curved

- I Usually herbs or small shrubs, staminal tube entire or slightly divided at the apex, angled or lobed —
 - A Fruit schizocarpic i.e. ripe carpels separate from the axis —
 - 1 Bracteoles 0 Styles as many as the carpels. Seeds without cotton. Fls usually yellow.
 - Carpels 7-10 1 ovuled .. 1 **Sida**
 - Carpels 5-20 2 or more ovuled .. 2 **Abutilon**
 - 2 Bracteoles usually 5 narrow stigmas spreading, carpels 5 spiny styles 10 flowers red .. 3 **Urena**
 - B Fruit capsular —
 - 1 Stigmas spreading —
 - Ovary 5 celled .. 4 **Hibiscus**
 - 2 Stigmas connate —
 - Bracteoles 3 large leafy persistent seeds cottony .. 5 **Gossypium**
 - Bracteoles 5 small subulate deciduous seeds not cottony .. 6 **Thespesia**
- II Trees, Staminal tube deeply divided into bundles of stamens —
 - 1 Leaves simple lobed Fls less than 1 in diam panicle Bracteoles 4-6 Seeds without cotton .. 7 **Kydia**
 - Leaves digitate Fls 1 in or more in diam, solitary Bracteoles 0 Seeds with cotton. .. 8. **Bombax**.

1. SIDA, Linn.

Herbs or undershrubs. *Leaves* simple, sometimes lobed. *Flowers* yellow, opening at noon; peduncles generally jointed. *Bractëoles* 0. *Calyx* tubular below; segments 5, valvate persistent. *Corolla* of 5 petals, connate below. *Staminal tube* divided above into numerous filaments. *Carpels* 5 or more, separating from the axis in fruit, generally 2-awned at the summit, each with a solitary pendulous ovule dehiscing irregularly and between the awns. *Seeds* solitary.

Leaves linear-lanceolate, acuminate, nearly glabrous, subsessile.

Leaves usually more or less rhomboid, stellately hoary underneath on petioles, .3-7 in. long.

Leaves cordate-oblong, downy on petioles, 1-2 in. long.

1. *S. carpinifolia*

2. *S. rhombifolia*.

3. *S. cordifolia*.

1. *Sida carpinifolia*, Linn. Vern. *Borialu*, Ass. (Darr); *Berela* or *Sret-berela*, Beng.; *Ting-khilou*, Lushai; *Balu-phomijivika*, Sans.

Small undershrub in grass lands. *Leaves* 2-3 in. long, linear lanceolate, acuminate. *Peduncles* short, jointed in the middle. *Carpels* 5-9, rugose, awned.

2. *Sida rhombifolia*, Linn. Incl. *S. rhomboidea*, Roeb. (sp). Vern. *Borialu*, Ass.; *Berela* or *Sret-berela* Beng.; *Soh-byrt-it-rit*, Khasi; *Mahabala*, *Atibala*, *Pitapushpa*, Sans.

A shrub up to 5 ft. in height, very variable in shape and size of leaf and length of peduncle. *Leaves* 5-3 in. long, generally rhomboid, more or less pubescent above, stellately grey-tomentose beneath; base 3-nerved, usually cuneate; sometimes obtusely; petiole about $\frac{1}{3}$ th the length of the blade. *Peduncle* .5-1 in. long, jointed above or below the middle. *Carpels* 10, awns generally inflected, sometimes (Var. *rhomboidea*) almost absent.

3. *Sida cordifolia*, Linn. Vern. *Berela*, *Bala*, Beng.; *Batyalaha*, *Bala*, Sans.

A small undershrub generally found near moist places. *Leaves* 1-2 by .6-1.2 in. oblong, cordate, obtuse, crenate downy on both surfaces; petiole as long as the blade. *Peduncles* jointed near the flower, lower longer than the petioles, upper very short. *Carpels* 10; awns exceeding the calyx and covered with stiff reflexed hairs.

The above three plants are common throughout the province up to about 3000 ft. They flower during the rains or shortly after. Their roots have valuable medicinal properties, and their stems yield a fine white silky fibre much superior to jute and therefore of considerable potential commercial value.

2. ABUTILON, Gaertn.

Abutilon indicum, G. Don. Sans. *Atibala*, *Kankatika*; Vern. *Jhapa*, Ass.; *Tepari* or *Petari*, Beng.; *Sani-kunthon*, Cach.

A perennial herb sometimes up to 8 ft. in height, stem covered with soft velvety tomentum. *Leaves* .5-6 in., nearly as

broad as long, ovate or orbicular-cordate, acute or acuminate, entire or distantly irregularly toothed, stellate pubescent above, finely grey-felted and also with scattered hairs underneath, palmately 5-9 nerved at the base; petiole .3-4 in., felted; stipules small, deflexed. *Flowers* golden-yellow, 1 in. in diam., opening in the evening; calyx-segments ovate-acute, valvate; peduncles 1-3 in. long, 1-flrd., jointed about .25-1 in. below the flower. *Stamens* as in *Sida*. *Fruit* broadly bell-shaped and flat topped; carpels 15-20, separating from the axis, coarsely felted but glabrescent, apiculate at the apex; seeds 1-3 in each carpel.

Occasionally met with in grass lands in NOWGONG, DARRANG & NAGA HILLS.

The leaves give a mucilaginous extract which is used as a demulcent. An infusion is prepared from the roots which is considered good as a cooling remedy in fevers. The seeds are used as a laxative and also as a demulcent. The stem gives a good fibre suitable for ropes.

Several exotic species of *Abutilon* are grown in gardens for their handsome flowers.

Fls. & Fr. 10-2

Malvastrum coromandelianum, Græke, Syn. **M. tricuspidatum**, A. Gray. An erect undershrub or perennial herb upto 3 ft. high covered with stellate hairs the arms of which are adpressed on the undersurface of leaves, petiole and calyx. *Leaves* 7-3 in. long, ovate or ovate-lanceolate, irregularly serrate, 5 nerved at the base, strigose with simple hairs above; petioles upto 1.2 in. long; stipules linear. *Flowers* yellow, solitary, 5-7 in across; bracteoles 3 half the length of the calyx. *Calyx*-lobes triangular cleft nearly half way down. *Petals* exceeding the calyx. *Carpels* 8-12, reniform, separating from a short central torus, indehiscent, strigose, and 3-cuspidate when mature.

An introduced plant now run wild in several districts in LOWER ASSAM in waste lands. A good fibre can be obtained from the stems. Closely resembles a *Sida* from which it can be distinguished by the presence of bracteoles.

3. URENA, Linn.

Urena lobata, Linn. Vern. *Hon-borokua*, Ass. (Sib-); *Sokamara*, Ass. (Darr); *Agra*, Ass. (Kamrup); *Tangom*, Miri; *Nonth-arony*, Mik.; *Sam-thai*, Mech; *Sompok-pi*, Manipuri; *Samthai*, *Samkhonthai*, Cach.; *Dalle-kurro*, Nep.; *Samthe*, *Samthakhar*, Garo; *Bagh-ehhaka*, Jharua and Mech; *Soh-byrthit*, *Soh-byrthit*, Kh.

An undershrub up to 5 ft. in height; more or less covered all over with spreading stellate pubescence. *Leaves* very variable in shape and size, .5-3 by .3-1 in., ovate to broadly cordate-orbicular, generally broader than long, persistent, 5-7 lobed, 5-9 nerved at the base, coarsely toothed or serrate, somewhat hispidly pubescent above but softly and more densely beneath; midrib and sometimes two adjacent nerves with a glandular pore; petiole 2-2.2 in. long; stipules short, linear, both densely brown stellate pubescent. *Flowers* pink, with a darker centre, .6-1.2 in. across; one or more on axillary peduncles; pedicels short, clustered; bracteoles 5, connate below; lobes equalling the calyx. *Calyx* deciduous, tube short, lobes up to .2 in. long, ovate to oblong-lanceolate, ciliate, pubescent on the midrib outside, glabrous within. *Petals* 5, tomentose outside, connate below and adnate to the staminal tube. *Staminal-tube* cylindric. *Ovary* 5-celled, each

with one ovule; style with 10 capitate stigmatic branches; ripe carpels about .2 in. long, indehiscent, breaking off from the axis, densely tomentose as well as armed with stellately barbed bristles.

A common weed throughout this part of the province.

The root and bark have medicinal properties and the stem gives a strong white fibre suitable for twine and sacking.

Flrs. & Fr. 6-12.

4. HIBISCUS, Medik.

Herbs or shrubs or trees generally with large showy flowers. *Leaves* rounded or palmately lobed. *Inflorescence* generally axillary. *Bracteoles* 5 or more, free, connate, or spathaceous. *Calyx* 5 toothed or 5 fid, sometimes spathaceous. *Petals* 5, adnate at the base with the staminal tube. *Staminal-tube* giving off anther-bearing filaments along its entire length; anthers reniform, 1-celled. *Ovary* usually 5-celled; styles 5, connate below, spreading above. *Fruit* capsular; seeds glabrous or hairy.

- | | |
|--|-----------------------------|
| I. A small tree. Bracteoles many, deciduous; seeds bearded with long silky hairs. | 1. <i>H. macrophyllus</i> . |
| II. A large climbing shrub. Bracteoles 5, persistent; seeds covered with long white hairs. | 2. <i>H. fragrans</i> . |
| III. Annuals or undershrubs:— | |
| A. Bracteoles not provided with leafy appendages nor forked:— | |
| Bracteoles numerous, deciduous. | <i>H. Trionum</i> . |
| Bracteoles 6 or more, persistent but not accrescent. | <i>H. Abelmoschus</i> . |
| Bracteoles up to 6, broad, accrescent. | <i>H. pungens</i> . |
| B. Bracteoles with leafy appendages or forked:— | |
| A trailing prickly herb. Stipules semicordate auricled. | <i>H. surattensis</i> . |
| Erect undershrub. Stipules linear. | <i>H. radiatus</i> . |

1. *Hibiscus macrophyllus*, Roxl. Vern. *Pohu-udat*, Ass. (Sibs.); *Pharna*, Mik.; *Misi-mugrong-buphang*, Kach.; *Baiza*, Lushai; *Jabo*, Tipp., *Chamia*, Sylh. and Cachar; *Mao-marli*, Ass. (Garo); *Kong-Krouai*, Kuki; *Tylen-dkhar*, Khasi.

A small deciduous tree; young shoots, petioles, stipules and inflorescence shaggy with long tufted yellowish brown bristles, up to .4 in. long and stellate tomentum. *Bark* greyish white, somewhat rough on old stems, blaze at first yellowish-brown with streaks of brown tissue, turning darker brown after exposure. *Leaves* 7-12 in. across, orbicular, deeply cordate, abruptly short acuminate, entire or minutely crenulate on luxuriant shoots, thinly coriaceous, intricately stellate, tomentose on both surfaces especially the lower, palmately 7-9 nerved, turning yellow before falling; petiole 9-14 in. long; stipules 3-4 by .8-1 in., oblong, convolute. *Flowers* about 2.5-4 in. long, and across, in axillary and terminal cymes, each supported by a pair of large—up to 2.3 in. long—spathaceous caducous bracts; pedicels 1.5-2 in. long, jointed. *Bracteoles* 10-12, linear, 1-1.2 in. long, connate at the base. *Sepals* 5, connate below into a 10-ribbed cup. *Petals* 5,

imbricate, pale yellow* fading* to pinkish brown, with a deep purple blotch at the base inside. *Staminal* column yellow. *Styles* deep purple. *Capsule* about 1.5 by 1 in., oblong, pointed; seeds bearded with shining tawny hairs.

In open scrubs in the Mikir Hills, SIBSAGAR and NOWGONG, CACHAR, GAROHILLS, and foot of KHASI & JAINTHIA HILLS, NAGA HILLS and SYLHET.

The heartwood is light purplish-brown, even-grained, soft but durable, weighing about 35 lbs. per c. ft. It is much used for rafters, posts and sill plates, especially in the Garo Hills. The inner layers of bark give fibre suitable for cordage.

Fls. 3-4. Fr. 5-6

2. *Hibiscus fragrans*, Roxb. Vern. *Pichhola-lata*, Ass. (Lakh.); *Susang-rube*, Miri; *Nrok-pen*, Naga.

A large scandent shrub spreading on tall trees especially near streams. *Bark* on old stems with short vertical furrows; young parts and petioles minutely but closely stellate tomentose. *Leaves* 2.5 by 3.5-1.5 in., those near flowers much smaller, ovate, cordate, acute, distantly dentate or repand, at first stellately hispidulous above, buff-tomentose beneath, ultimately glabrescent, chartaceous, palmately 5-7 nerved; petiole usually rather more than half the length of the blade, slender, terete; stipules linear-lanceolate, about .7 in. long, caducous. *Flowers* white or light rosy-pink with a pale yellow centre, fragrant, 1.5-2.5 in. across; pedicels axillary generally 1-3 together, rarely panicle, 1.5-2.5 in. long, slightly thinner than the petioles, tomentose, jointed, .3-.8 in. below the flower. *Bracteoles* 5, .4-.6 in. long, ovate, connate below forming a broad shallow cup, persistent. *Calyx* lobes similar to bracteoles but a little larger. *Petals* finely longitudinally veined, .6-1 in. long, stellate pubescent outside. *Filaments* very slender, purplish. *Capsules* 1.4 by .8 in. ovoid, tan-hairy outside; seeds reniform, about 1 in. long, rugose, covered with radiating fine straight white or brown hairs, .6-.8 in. long.

Common throughout UPPER ASSAM including the E. FRONTIER DISTRICT ascending up to about 1000 ft.

Fls. 12-1. Fr. 1-3.

***Hibiscus Trionum*, Linn.**—A pubescent herb 4-5 ft. high growing annually from carrot like roots. *Lower leaves* orbicular, upper 3-5 lobed. It has large yellow flowers membranous ventricose deciduous calyx and numerous linear deciduous bracteoles. *Capsule* 1-1.5 in. long, hirsute; seeds glabrous.

Found in grass lands in NOWGONG.

Fls. 9-10. Fr. 11-12.

Not previously reported from this province,

***Hibiscus Abelmoschus*, Linn.** Eng. Musk-mallow. Sans. *Latakasturika*; Ar. *Habbel-mishk*, *Gorukhia-korai* (Sibs) Ass.; *Twmq-la-rit*, Khasi. A very variable hispid annual 3-5 ft. high. *Leaves* polymorphic palmate, 5-7 lobed or upper sagittate, 3.7 in. long, petiole with long deflexed hairs, shorter in upper leaves. *Flowers* about 4 in. across, yellow with purple centre on stout peduncles; bracteoles linear, 6-13, up to 1 in. long, much shorter than the capsule not accrescent; calyx spathaceous. *Capsule*, 1.7-3 in. long, beaked, sparsely setose; seeds reniform, striate.

Cultivated in many parts of India. Recorded from grass lands in SIBSAGAR; KHASI HILLS up to 3000 ft-probably also in many other localities in UPPER ASSAM.

The seeds when rubbed or ground have the smell of musk and are used in perfumery on account of this odorous principle. They are also used largely in Indian medicine. Coarse fibre suitable for cordage can be obtained out of the stem.

Flrs. 9-10. Fr. 10-11.

Hibiscus pungens Roxb. Vern. *Usipak*, *Usipag*. Miri : *Sidum-sipiag*, Abor : *Nam-afian-arong*, Mik. ; *Kakura*, Sylh. ; *Musa-megon*, Mech. ; *Tiew-malloi*, Khasi.—A bristly herb up to 12 ft. in height. *Leaves* 6-12 in. across, palmately 5-lobed ; lobes crenate ; petiole 5-10 in. long. *Flowers* 4-5 in. across, yellow with a purple centre on peduncles 2-3 in. long ; bracteoles 5, lanceolate up to 1·2 in. long, accrescent ; calyx spathaceous, membranous. *Capsule* 2 in. long, tapering to a point.

Fairly common in grass lands especially in the N. E. FRONTIER DISTRICT, ascending up to 3000 ft.

The paste of the roots is used by Miris as a poultice for sprains and inflammations.

Flowers 9-10 Fr. 10-11

Hibiscus surattensis, Linn. Vern. *Hansrong*, Mik. ; —A sorrel-like trailing acid plant covered with sharp recurved prickles. *Leaves* 1·5-3 in. across, palmately 3-5 lobed or suborbicular, crenate-serrate, prickly along the nerves beneath ; petiole 1·5-4 in. long, prickly ; stipules broad, ear-shaped, ciliate. *Flowers* light yellow with a dark centre on peduncles up to 3 in. long. *Bracteoles* about 10, persistent, 5-6 in. long, consisting of a bristly stalk supporting a peltately leafy, spatulate, ciliate blade with a linear caudate basal appendage 2·5-4 in. long. *Calyx* 5 cleft, accrescent in fruit, chartaceous generally pink, lobes ovate acuminate with bristle-topped prickles along the margins and midrib, upper prickles hooked. *Capsul* covered with bristle-like, shining, white or yellow hairs, seeds downy.

Diphu reserve, SIBSAGAR and similar localities round the Mikir Hills, GARO HILLS.

The Mikirs use the leaves and twigs as greens.

Flrs. & Fr. 10-11.

Hibiscus radiatus, Willd. —An undershrub armed with short scattered prickles. *Leaves* 1·5-3 by 1·5-2 in., usually palmately 3-5 lobed, lobes lanceolate or oblanceolate, serrate with few scattered bristles along the nerves beneath ; petiole up to 3 in. slightly prickly, more or less pubescent ; stipules linear up to 2·5 in. long. *Flowers* yellow with purple centre about 2·5 in. across, solitary on short stout axillary peduncles. *Bracteoles* 4-6 in., about 10, often unequally forked, bristly along the margins. *Calyx* membranous accrescent in fruit, lobes ovate acuminate, 5-7 in. long, armed with bristle pointed prickles on the margins, upper prickles hooked. *Corolla* 2·5 in. long, bell-shaped. *Capsules* ovoid, densely setose ; seeds smooth.

KHASI HILLS, Hooker & Thomson ; ASSAM without any locality—Fisher (!).

The following species are commonly cultivated :—

1. **H. esculentus**, Linn. Ochra, The edible Hibiscus, Lady's finger, Vern. *Dheros*, *Bhind*, Beng., *Bhindi*, Hind., *Bhendi*, Ass., *Tindisa*, Sans.—A tall annual with coarsely toothed 3-5 lobed leaves, deciduous linear bracteoles, yellow flowers with a crimson centre and pyramidal oblong pubescent fruits 5-10 in. long.

Largely grown for the unripe fruits which are in season during the later part of summer and the rains.

2. **Hibiscus mutabilis**, L. Vern. *Shfalpatma*, Beng.—A large shrub or a small tree with fairly large deeply cordate 3-5 lobed leaves, white or light rose, single or double flowers, 3-5 in. across which change to deep rose or red, and globose capsules.

3. *H. Rosa-sinensis*, Linn. Common garden Hibiscus, Chinese Shoe-flower. Vern. *Joba* (Ass. & Beng.), *Japa*, *Java*, *Jans*.—An ornamental shrub. *Leaves* up to 4 in. long, ovate acuminate, coarsely serrate, glabrous or nearly so, base 3 nerved. *Flowers* single and double ranging from orange yellow to salmon and crimson from the upper axils with linear lanceolate bracteoles. *Fruits* not formed in our area.

Flowers almost throughout the year in warmer districts but mainly from April to October.

4. *H. syriacus*, Linn.—A taller shrub than the last often with erect slender branches. *Leaves* ovate or sub-rhomboid, upper more or less 3-lobed, toothed, nearly glabrous, up to 2 in. long. *Flowers* white or light pink to lilac blue with a purplish centre.

Common, frost hardy and grown more commonly in hills than the last species.

5. *H. schizopetalus*, Hk. f. *Leaves* narrow, ovate, coarsely toothed, usually 1.5-3 in. long. *Flowers* red or orange. *Calyx* spathaceous. *Petals* deeply lacinate and reflexed, staminal column long, slender, pendulous. Cultivated in gardens in the plains; flowers in hot and rainy season. A native of Africa.

5. GOSSYPIUM, Linn.

This genus differs from *Hibiscus* by having 3 large leafy cordate bracteoles which with the calyx are sprinkled with black glandular dots and by the seeds being covered with intricate woolly hairs which is the cotton of commerce.

Gossypium herbaceum, Linn. Vern. *Kopafi* Ass., is cultivated by the hill-tribes of Assam e.g. the Mikirs, Nagas, Kukis, Daflas and Garos. *Leaves* 3-5 lobed, nearly glabrous; stipules ovate or lanceolate. *Bracteoles* as long as the capsule and much exceeding the truncate calyx. *Flowers* yellow, generally with a purple centre. *Capsule* ovoid, 3-5 celled with 5-7 seeds in each cell, pendulous when open, presenting a striking appearance with the hanging balls of white cotton.

Fls. 8-9. Fr. 10-11.

6. THESPESIA, Soland ex Corr.

Thespesia macrophylla, Blume. Syn. *T. Lampas*, Dalx. et Gibs. An undershrub up to 5 ft. high; young parts rusty pubescent. *Leaves* 3.5-8 by 3-6 in., palmately 3-6 lobed, lobes usually acuminate, middle largest, upper smaller, rough pubescent or glabrate above, softly stellate tomentose beneath, both surfaces with raised dots, midrib with a glandular pore near the base on the under-surface; base usually 7-nerved; petiole up to 4 in. long; stipules subulate, caducous. *Flowers* 3-4 in. across, yellow with crimson centre, 1-3 on axillary peduncles up to 5 in. long; pedicels .3-.5 in. *Bracteoles* 5-8, setaceous, caducous. *Calyx* persistent, small, cupular, with 5 subulate teeth up to .3 in. long, from a truncate margin. *Corolla* lobes convolute, staminal tube 5 toothed at the apex. *Ovary* usually 5 celled; style club-shaped, 5 furrowed; ovules few in each cell of ovary. *Capsule* 1 in. long, ovoid, pointed, 5 celled, loculicidal; seeds smooth.

GOALPARA, NAGA HILLS, probably also in other areas.

Perennial or flowering shoots die down to the root?

Fls. 8-10. Fr. 10-12.

7. KYDIA, Roxb.

Trees with stellate pubescence and mucilaginous bark. *Leaves* palmately nerved, lobed or angled; 1-3 of the innermost nerves with a large oblong gland near the base. *Flowers* small, numerous, polygamous, in terminal panicles; bracteoles 4-6, connate at the base, accrescent and spreading in fruit. *Sepals* 5, valvate, connate at the base. *Petals* 5, obcordate, adnate to the staminal tube. *Staminal-tube* split half-way down into 5 segments each bearing at the apex 3-5 sessile anthers, which are imperfect in the female flowers. *Ovary* 2-3 celled; style 3-cleft; stigmas 3, imperfect in the male flowers; ovules 2 in each cell, ascending. *Capsule* depressed-globose, 3-valved; seeds reniform, furrowed.

Leaves downy beneath; bracteoles oblong or obovate, downy or hispid.

.. 1. *K. calycina*.

Leaves glabrate; bracteoles oblanceolate, glabrous, shining.

.. 2. *K. glabrescens*.

1. *Kydia calycina*, Roxb. Vern. *Pichhola*, Ass. (Sibs); *Bon-kopah*, *Bon-kopahi*, *Kukuha*, Ass. (Nowg.); *Kukuha*, Ass. (Darr.); *Arlak-arong*, *Arlakso-arong*, *Pakrak*, *Star-misiri-arong*, Mik., *Modon-phang*, Kach.; *Jabri-changne* Daff.; *Heppaching*, Naga; *Kubinde*, Nep. *Musamugon-buphang*, Mech; *Boldubak*, Garo; *Chakle*, Jharua; *Wok-thing-thel*, Kuki; *Kotru*, Ass. (Kamrup); *Dieng-misiri*, *Dieng-lainnep*, Khasi.

A moderate-sized fast-growing deciduous tree with a gregarious tendency; young parts covered with grey stellate hairs. *Bark* grey, exfoliating in long strips, reddish inside, green underneath the corky layer, innermost layers fibrous and lace-like; branches rough with large white specks. *Leaves* 3-6·5 in. long, suborbicular or orbicular, often broader than long, palmately 5-7 nerved and generally with as many lobes; base slightly cordate or truncate, glabrate above, downy and pale beneath; petiole 1-4·2 in. long. *Flowers* generally white, 5-7 in. across, numerous, polygamous, generally dioecious, in much branched axillary and terminal panicles; pedicels slender, 5-7 in. long, generally tufted, stellate-downy; bracteoles 4-6, oblong or obovate, accrescent, persistent, downy at first, afterwards hispid with the bases of fallen hairs, prominently veined and spreading. *Sepals* ovate, acute, accrescent and incurved over the fruit. *Petals* clawed. *Capsule* depressed-globose, about 2 in. across, buff or yellow-villous.

Mostly in patches of deciduous forests in SIBSAGAR, DARRANG and almost throughout NOWGONG, e. g. Nichuguard, Kalioni, Kaziranga, Bhalukpong, Charduar, Silghat, Lanka, Dimapur etc.; LAKHIMPUR, GARO HILLS, N. E. FRONTIER, KHASI HILLS, KAMRUP, GOALPARA, North Cachar Hills, NAGA HILLS.

The wood may be found suitable for matches. The fibrous inner bark is used for tying purposes. The mucilaginous substance of the bark is used in Northern India for the clarification of sugar. About 900 seeds weigh 1 oz.

2. *Kydia glabrescens*, Mast. Vern. *Subi-asing*, Miri. *Kukuha*, Ass. (Darr.). This tree looks so very much like the foregoing

species that where they occur together the same vernacular names are applied indiscriminately to both.

A tall tree up to about 100 ft. in height and 7 ft. in girth; branchlets nearly glabrous. *Bark* grey outside, scurfy on old stems, cream-coloured inside with reticulating strands of firmer tissue which is reddish on old trees, green underneath the corky layers, 5-8 in. thick. *Leaves* 3-4.5 in. diam., orbicular, rather broader than long, those below the inflorescence much smaller and generally elliptical, 5-7 nerved at the base, not or very slightly lobed at the extremities of the three innermost nerves, chartaceous, glabrous at least when mature, tertiary and ultimate nervules visible but extremely fine and elegantly reticulated. Old leaves turn yellow before falling. *Panicles* terminal and axillary; pedicels fascicled, 5-7 in. long, filiform, obscurely stellate-hirsute; bracteoles 4-6, but generally 4 only, 4-6 by 1-1.5 in., oblanceolate, glabrous, shining, spreading in fruit. *Sepals* glabrous, nerved. *Petals* not seen. *Capsule* as in the last species.

Sadiya, Khairempani, Dorkang Chapuri, Songkong, etc., N. E. FRONTIER DISTRICT; Margherita, Borjan, Jeypur, Gagaldubi, etc., LAKHIMPUR, Dilli, Baruasali, Holongapar, etc., SIBSAGAR and in the Charduar Reserve in DARRANG. Probably never wholly leafless.

Squirrels and bears seem to be fond of the bark.

Figs. 8-9. Fr. 11-12.

8. BOMBAX, Linn.

Deciduous tree. *Leaves* digitate. *Flowers* solitary or clustered, congregated at the ends of branchlets appearing before the leaves; bracteoles 0. *Calyx* leathery, cupshaped, irregularly 2-5 lobed or truncate. *Petals* obovate or oblong. *Stamens* indefinite, adnate to the petals; filaments often combined; anthers reniform. *Ovary* 5-celled; ovules many in each cell; style clavate. *Capsule* loculicidally 5-valved, cells woolly within. *Seeds* imbedded in dense wool; albumen scanty.

Filaments flattened at the base, stamens less than 100.

Filaments thread-like, stamens more than 400.

.. 1. *B. malabaricum*.

.. 2. *B. insignis*.

1. *Bombax malabaricum*, DC. The silk cotton tree. Sans. *Shalmali*. Vern. *Simal*, *Simul*, Hind. & Beng., *Simolu*, *Himolu*, *Himila*, Ass.; *Singi-asing*, *Miri*; *Pharkong-arong*, Mik.; *Bonju-phang*, *Ponju-phang*, Kach.; *Hebui-bang*, *Naga*; *Dieng-Kymphad*, *Dieng-syr-ah*, *Khasi*, *Dieng-kya-Synt.*; *Phunchong*, *An-pung*, *Kuki*, *Simla*, *Mech.*, *Bolehhu*, *Garó*.

A lofty deciduous tree; stem continuous and straight, more or less buttressed at the base when old, covered with large conical prickles when young; branches whorled, horizontally spreading. *Bark* dark-brown or grey smooth on young trees but vertically fissured and rough on old trees, blaze light pinkish white, soft and fleshy with coarse strands of bast, green underneath the corky layer. *Leaves* digitate; common petiole 6-12 in. long. *Leaflets* 5-7; 6-9 by 3-5 in., lanceolate oblanceolate or obovate, acuminate, entire, chartaceous or coriaceous, glabrous; petioles 1 in. long;

stipules small, caducous. *Flowers* 4-5 in. across, fleshy, near the ends of the branches on short fleshy pedicels. *Calyx* very fleshy, cup-shaped, white-silky inside, slightly lobed at the margin, deciduous. *Petals* crimson or orange, rarely white, 3-6 by 1-2 in., recurved, white-stellate canescent outside. *Stamens* shorter than the petals, arranged in 5 bundles and an inner bundle of 15, of which the 5 innermost are longest and forked; filaments 70-90, deep pink, sparingly covered with spreading hairs, flattened at the base; anthers twisted after dehiscence. *Style* 5, lobed at the apex, exceeding the stamens. *Capsule* 5-7 in. long, oblong-ovoid, woody, 5-angled. *Seeds* obovate, glabrous and smooth, embedded in silky wool.

Gregarious on river-flats but occurs sporadically in all sorts of forests throughout the province, more generally along open streams.

The wood is porous, soft and perishable, but durable under water or when seasoned in water; weight 17-30 lbs. per c. ft. It is pre-eminently the favourite tree for tea boxes, and is very suitable for well curbs, water-shoots etc. The cotton is used in upholstery and to stuff pillows and cushions. The seed is a nourishing food for cattle which also eat the flowers greedily. The roots of saplings are believed to possess valuable medicinal properties, as also the gum which sells in the bazars of N. India under the name of *mochras*. About 750-900 seeds weigh 1 oz.

Leafless 12-3. Fls. 1-3. Fr. 4-5.

2. Bombax insigne, Wall. Vern. *Dhumbhoil*, Cachar; *Tera*, Manipur; *pang*, Lush.; *Anphang-thing*, Kuki.

A Moderate sized to large tree with blunt prickles or unarmed. *Bark* fibrous exfoliating in numerous thin papery flakes, brownish grey outside on young stems but blackish brown on old trees, flesh coloured underneath the corky layers, light brown inside. *Petioles* 7-8 in. long; leaflets 7-9; 4.5-6.5 in. by 1.3-2 in., oblanceolate, or obovate shortly acuminate, glabrous, lateral nerves 15-18 pairs on either half, nervules finely reticulate, base narrowed to the short margined petiolule .2-.5 in. long. *Flowers* usually brick-red, solitary, scattered on the leafless branches, pedicels stout, short, jointed at the top. *Calyx* up to 2 in. by 1.5 in. across, silky inside, often warty outside, 2-lobed or finally deeply 2 cleft. *Petals* 5-6 in. by 1.5 in., reflexed when fully opened, stellate pubescent outside. *Stamens* in 5 phlanges, staminal tube short, filaments 400-600, filiform, shorter than the corolla. *Stigma* with 5 radiating lobes. *Capsule* 5-7 in. by 1.5 in., oblong, glabrous.

Not common. CACHAR, LUSHAI HILLS, SYLHET.

Wood similar to that of *B. malabaricum* but more durable and the pores are smaller. About 330-570 seeds weigh 1 oz.

Fls. 12-1. Fr. hot season.

Eriodendron anfractuosum, DC. The white silk cotton tree. A tall deciduous tree with prickly stem when young. *Leaves* digitate, petioles 4-6 in. long, stipules caducous; leaflets 5-8, 2-3 in. long, lanceolate, entire, glabrous, glaucous beneath, petiolules very short. *Flowers* 1.5-2 in. across, white or yellowish at the ends of the branches; bracteoles 0. *Petals* woolly outside; ovary glabrous. *Capsule* 4-5 in. long, fusiform; seeds imbedded in silky wool.

Planted occasionally in the plains e.g. SIBSAGAR, native of S. AMERICA, WEST INDIES, CEYLON

The floss from the capsules commercially known as *kapok* is of better quality than that of *Bombax malabaricum* and is used for the same purposes.

FAM. 24. STERCULIACEÆ.

Trees or shrubs, rarely climbing; young parts usually covered with stellate pubescence, often inter-mixed with simple hairs. *Bark* mucilaginous and with strong-fibre. *Leaves* alternate, simple and lobed or digitate, stipulate. *Flowers* generally regular, 1 or 2-sexual or polygamous, in axillary or terminal cymes or panicles, rarely solitary or fascicled. *Calyx* usually gamosepalous; segments 5. *Petals* 5 or 0. *Stamens* usually monadelphous with 5 to 25 2-celled anthers. *Ovary* stipitate or sessile, free, 2-5 celled; carpels free or combined; styles as many as cells in the ovary, distinct or more or less connate; ovules usually 2-many in each carpel. *Fruit* capsular, indehiscent or follicular. *Seeds* not wooly.

1. Flowers unisexual or polygamous. Carpels distinct. Petals none. Trees :—
 - Fruit carpels whorled, dehiscent. ... 1. *Sterculia*.
 - Fruit carpels solitary, indehiscent. ... 2. *Heritiera*.
- II. Flowers bisexual. Carpels combined. Petals present :—
 - A. Erect shrubs or trees; capsule not echinate.
 1. Seeds not winged. Shrubs; leaves palmately lobed or angled :—
 - Capsule cylindric, coriaceous. ... *Helicteres*.
 - Capsule turbinate, membranous. ... 3. *Abroma*.
 2. Seeds winged. Trees; leaves entire, lobed or coarsely toothed :—
 - Flowers solitary or in few-flowered cymes, usually large; staminal column with 5 staminodes. ... 4. *Pterospermum*.
 - Flowers in many flowered corymbose panicles; rather small. Staminodes 0. ... 5. *Reevesia*.
 - B. A climber :—
 - Seeds not winged. Flowers minute; capsule more or less echinate. ... 6. *Buettneria*.

1. STERCULIA, Linn.

Trees with simple, often lobed, or digitate leaves. *Flowers* polygamous in terminal or axillary panicles. *Calyx* tubular, generally coloured. *Petals* 0. Staminal column bearing at the apex a ring of sessile anthers. *Ovary* of 5 carpels; styles connate at the base; stigmas radiating. *Fruit* of radiating follicles.

woody or membranous, generally opening before ripening. *Seeds* one or more in each carpel, albuminous, sometimes winged or arillate.

- I. Leaves digitate. Flowers small. Follicles coriaceous. .. 1. *S. versicolor*.
- II. Leaves simple, palmately lobed. Calyx-segments shorter than the tube :—
 - Flowers small in long panicles. Follicles coriaceous. .. 2. *S. villosa*.
 - Flowers fairly large in short stiff panicles. Follicles papery. .. 3. *S. colorata*.
- III. Leaves simple, usually not lobed. Calyx segments many times longer than the tube :—
 - A. Seeds 4-8 in each follicle, not winged :—
 1. Leaves tomentose beneath. Pedicels up to 3 in. long. .. 4. *S. guttata*.
 2. Leaves wholly glabrous. Pedicels up to 1 in. long, capillary :—
 - Leaves rounded at base. Racemes short, erect. Calyx-segments never cohering at the tips. Follicles pink, downy. .. 5. *S. Roxburghii*.
 - Leaves tapering at base. Panicles long, drooping. Calyx segments often cohering at the tips. Follicles crimson, velvety. .. 6. *S. coccinea*.
 - B. Seeds numerous, prominently winged :—
 Calyx-segments scarcely exceeding the tube. Leaves cordate, wholly glabrous. .. 7. *S. alata*.

1. *Sterculia versicolor*, Wall. Vern. *Durong-phang*, Kach. ; *Khai-pang-thing*, Kuki ; *Star-um*, Khasi.

A lofty tree with a long straight bole and spreading crown ; branchlets thick with a large pith and marked with prominent scars of fallen leaves and stipules. *Bark* grey or cinnamon-brown and with many horizontal wrinkles outside, exfoliating in papery flakes, inside white with reticulating thin strands of white fibrous tissue, the outer edge of blaze mottled brown, the rest with concentric layers of bast, .6-.75 in. thick. *Leaves* digitate ; petiole 10-18 in. long ; leaflets 7-9, 6-11 by 2-4 in., elliptic, lanceolate or oblanceolate, very shortly petioluled, quite entire, subcoriaceous, glabrous above, puberulous or glabrescent beneath, lateral nerves 28-32 on either half, oblique, straight or slightly arched ; tertiaries subparallel, transverse to the secondaries, about .06 in. apart ; ultimate nervules very closely though obscurely reticulated. *Panicles* 10-14 in. long, 8-12 crowded at extremities of branches above the current year's leaves ; flower-buds globose, .05-.08 in. diam., buff tomentose. *Flowers* pale yellow, 2-2.5 in. long, very shortly pedicelled. *Calyx* campanulate ; segments oblong, inflexed, shorter than the tube. *Staminal column* curved. *Ovary* 5-lobed, buff-villous. *Follicles* 5-6, 3-3.5 by 1.5 in., slightly compressed, coriaceous, obscurely ribbed, covered with dark brown urticating brittle hairs. *Seeds* up to 10 in each follicle, .6 by .3 in., oblong, with a jet-black shining aril and a knob at the hilum.

At the foot of the NAGA HILLS near Nichuguard, Naojan, SIBSAGAR, N. CACHAR HILLS, KHASI HILLS up to about 2500 ft.
The seeds are eaten roasted.

2. *Sterculia villosa*, Roxb. Vern. Udal, Odal, Odla, Ass. ; *Sergok-asing*, Miri & Abor. ; *Chekong* or *Chikong-arong*, Jinje-kong, *Theng-chi-kong-long*, *Kongkulu*, Mik., *Dukhundu-phang*, *Tekundu-phang*, Cach. *Heppuk-bang*, Naga ; *Udal*, Sylh., Cach. and Daff. ; *Ubak*, *Upak*, *Umak*, Garo ; *Dieng-star*, *Tluh*, Khasi ; *Odal*, Mech ; *Ruija*, Kuki ; *Japui-kung*, Tipp.

A moderate-sized deciduous tree with a spreading crown and a gregarious tendency ; branchlets thick, with large heart-shaped scars of fallen leaves, more or less whorled on young trees. *Bark* grey, more or less smooth, 1 in. thick ; inside light red, fibrous. *Young* shoots, petiole, and inflorescence brown tomentose with stellate and spreading hairs inter-mixed. *Leaves* crowded at the ends of branchlets, simple, but deeply 5-7 lobed, deeply cordate, 10-18 in. across, light red when very young ; lobes oblong or ovate, acuminate, with entire distantly toothed or lobed margins, glabrescent or covered with scattered stellate hairs above, tomentose beneath ; petiole 10-16 in. long, minutely tomentose ; stipules lanceolate, acuminate, caducous. *Flowers* dun-yellow, '25 in. across, in crowded drooping panicles 9-12 in. long from the ends of shoots, males more numerous than females ; pedicels slender. *Ovary* campanulate, membranous, stellate-pubescent outside, lobes short, acute, erect. *Male fls.*-Staminal column with 10 anthers. *Female fls.*-*Gynophore* about '2 in. long. *Ovary* globose, stellately hairy, staminodes in a ring beneath the ovary. *Follicles* 2-5, sessile, 2-3.5 by 1-1.2 in., reddish-brown and tomentose outside, scarlet and shining inside. *Seeds* '3 by .25 in. oblong, oily, with a shining black aril.

Common in deciduous forests throughout ASSAM, especially on gravel beds of hill-streams ascending to about 2500 ft. ; often tending to become gregarious.

Wood soft, light and open-grained, weighing about 20 lbs. per c. ft. It can be used for tea-boxes. The inner bark yields a coarse strong fibre which is made into ropes or breast-bands for elephants for dragging timber. The seeds are eaten baked or roasted. The tree exudes a clear white gum which in other parts of India is used medicinally especially in veterinary practice. About 110-120 seeds weigh 1 oz.

Leafless 12-4. New leaves 4-5. Fls. 3-4. Fr. 4-6.

3. *Sterculia colorata*, Roxb. Vern. *Jhari-udal*, *Jari-udal*, *Kath-udal*, Ass. ; *Sangkru-arong*, Mik. ; *Bohog-odla*, Mech ; *Bol-ujun*, *Chengsu*, *Walgem*, Garo ; *Dieng-symphlor*, *Dieng-Sangkhlor*, Kh.

A spreading deciduous tree up to about 40 ft. in height and 5 ft. in girth, usually precocious ; branchlets stiff but not very thick, glabrous. *Bark* about 2 in. thick on mature trees, dark-grey outside, white with bands of soft granular tissue alternating with strands of fibrous porous tissue inside. *Leaves* 4-10 in. long and as broad or slightly broader, very variable, usually deeply 3-5 lobed with caudate-acuminate lobes on saplings, slightly lobed or not lobed at all on mature trees, palmately 5-7 nerved, chartaceous, glabrescent on both surfaces ; ultimate nervules very closely reticulate ; base generally deeply cordate, especially on saplings ; petiole about as long as the blade or

slightly shorter; stipules caducous, lanceolate. *Flowers* about .7 in. long, solitary or in fascicles of 2-3 in short erect panicles from axils of fallen leaves, both densely covered with orange red stellate tomentum. *Calyx* funnel-shaped, lobes short, acute or obtuse, tube long, persistent in fruit, ultimately purplish outside, yellowish stellate tomentose within, with a ring of tufted hairs towards the base. HERMAPHRODITE FLRS.—*AntHERS* 20-30, sessile on a long gonophore, which is ultimately exerted by .25-.3 in. beyond the calyx, surrounding the 5 very small flask shaped carpels; styles recurved. MALE FLRS.—*Staminal* column about .2 in. long, carpels of pistillode smaller than those of hermaphrodite flrs. *Follicles* 2-3 in. long, stipitate, membranous, glabrous, pink outside, green inside, venose, opening long before maturity. *Seeds* 2-3 in each follicle, about .3 in. by .25 in., ovoid smooth, light green.

KHASI AND JAINTHIA HILLS, GARO HILLS, NORTH CACHAR HILLS, GOALPARA, NAGA HILLS.

Leafless 12-4. Flrs. 2-3. Fr. 3-5.

4. *Sterculia guttata*, Roxb. Vern. *Hirikh*, Ass.

A large evergreen tree with a simple stem and oval crown; young parts and inflorescence rusty stellate tomentose. *Bark* dark-brown, rough with warts outside, much cracked on old trees, fibrous, white mottled with brown, quickly turning uniformly brown inside. *Leaves* simple, not lobed, ovate elliptic or obovate acute or abruptly short acuminate, 6-10 by 3.5-6 in., entire, subcoriaceous, glabrescent and rugulose above, rusty tomentose beneath, often somewhat inequilateral, turning yellow before falling; lateral nerves 10-14 on either half, with midrib very prominent beneath, tertiaries subparallel, transverse to the secondary nerves, quaternaries reticulate; base rounded or slightly cordate; petiole 1.5-2.5 in. long, stout, slightly swollen and geniculate, caducous. *Flowers* pale; chiefly male, .5-.6 in. long, in narrow racemiform panicles; buds lanceolate or spindle-shaped; pedicels .2-.3 in. long, rusty hairy; bracts lanceolate, .3-.5 in. long. *Calyx* deeply 5-partite; segments .3-.5 in. long, narrow-lanceolate, rusty tomentose outside, glandular and with scattered long hairs inside, sometimes cohering at the tips; tube very short. MALE FLRS.—*Staminal* column .3 in. long, slender, curved; anthers 10-15, very small, sessile. HERMAPHRODITE FLRS. (functionally female?). *Gonophore* stout. *Ovary* surmounting the ring of anthers, globose, woolly, 3-5 lobed; styles curved. *Follicles* red, 1-5; 3-5 by 1.3-1.7 in., coriaceous, compressed, tomentose outside, smooth and pink inside. *Seeds* 3-4 in each follicle, ellipsoid, .8 by .6 in., black, smooth; albumen oily; cotyledons elliptic.

Digboi, Borjan, Dulong Reserve and similar other places in the LAKHIMPUR DISTRICT.

The seeds are eaten roasted. In the Malabar coast a kind of coarse rug is made by beating and washing the inner bark which is opened and taken off whole in lengths of 6 ft. or so

Fls. 4-5. Fr. 8-9.

5. *Sterculia Roxburghii*, Wall. Vern. Nag-phona, Nag-phena, Ass. ; *Mimong-omak*, *Misi-chik-udari*, Garo.

A small or middle-sized tree. *Bark* dark-brown, somewhat rough outside, light brown inside, turning deep brown after exposure. *Leaves* 3-8 by 1-3.5 in., variable in size and shape, simple, ovate, obovate, elliptic-oblong or lanceolate, shortly cordate-acuminate, entire, chartaceous or subcoriaceous, glabrous ; main lateral nerves 6-8 on either half, oblique and much arched, the lowest sub-basal ; base rounded ; petiole .5-1.3 in., terete, swollen and geniculate near the insertion of the blade. *Racemes* 2-4 in. long, narrow, erect from axils of fallen leaves and also axillary ; pedicels .3-1 in. long, bracteate, slender, stellately hirsute. *Flowers* about .5 in. across, brick-red ; buds ovoid ; male fls. more numerous. *Calyx* campanulate, 5 partite ; tube short. *Follicles* pink, 1-5, spreading, 2-3 by .7-.9 in., compressed, thickly coriaceous, beaked, downy. *Seeds* 4-8, black, ovoid.

Sporadic in evergreen mixed forests in LAKHIMPUR, SIBSAGAR and GARO HILLS.

The roasted seeds are eaten.

Flrs. 2-3. Fr. 6-7.

6. *Sterculia coccinea*, Roxb. Vern. *Nak-che-peta*, Ass. ; *Saglepapio*, Miri ; *Konkelu*, Mik., *Tatom-pelom-changne*, Duff.

A shrub or a small tree. *Bark* grey, warty, green below the cuticle, thin, whitish inside. *Leaves* 4-12 by 2-3.5 in., oblanceolate, abruptly short acuminate, often bluntly, and tapering to the narrow base, quite entire, chartaceous or sub-coriaceous, glabrous above, generally with stellate or simple minute adpressed hairs beneath ; lateral nerves about 12 on either side of the strong midrib, arched and anastomosing near the margin ; petiole 1-2 in. long ; terete, thickened and slightly geniculate below the insertion of blade ; stipules subulate, .2-.25 in. long, caducous, rusty pubescent. *Panicles* 4-7 in. long, axillary, rarely supra-axillary, generally long-peduncled ; branches of panicles and pedicels capillary, the latter .2-.3 in. long. *Flowers* pale, over 1 in. in diam., when fully expanded. *Calyx-tube* very short, lobes .5-.6 in. long, very narrow, patently white-hairy, free or cohering at the tips. *Follicles* 2-5, scarlet, 3-5 by .6-.8 in., thinly coriaceous, velvety outside, glabrous and bright-red inside. *Seeds* 4-8, ovoid, smooth.

Fairly common in LAKHIMPUR, SIBSAGAR and DARRANG also in the MIKIR, NAGA, GARO and KHASI HILLS (ascending to about 3000 ft.)

The tender fruit is eaten cooked like beans and mature seeds are eaten fried or roasted.

Flrs. 8-9. Fr. 4-5.

7. *Sterculia alata*, Roxb. vern. *Pahayi*, Ass. (Sibs) ; *Bong-long-thing* or *Pong-long-thing*, Mik. ; *Thailokhrong*, *Bandar-pela*, Cach. ; *Khamari*, Nep. ; *Phunber-pui*, Lusbai ; *Bantai*, Kuki ; *Mi-bol*, Garo ; *Dieng-klong*, *Dieng-soh-lakor*, Khasi.

A tall tree up to 150 ft. in height and 9 ft. in girth with a high narrow conical crown and horizontal branches ; young parts golden-pubescent. *Bark* greyish-brown, more or less smooth, but

with horizontal wrinkles and shallow vertical-fissures about .25 in. apart; green underneath the corky layers, and dun-yellow, fibrous, with distant strands of light green tissue inside. *Leaves* simple, 4-10 by 3-8 in., ovate, cordate, subacute, chartaceous, glabrous; basal nerves 7, lateral 4 on either half, tertiary transverse to the main nerves; petiole 1.5-4 in. long; stipules tubulate, caducous. *Panicles* from axils of fallen leaves, few-flowered. *Flowers* brownish-yellow, .6-1 in. across. *Calyx* campanulate, divided half way into 5-6 thick linear-lanceolate segments, densely rusty stellate-tomentose outside and with red veins inside. **MALE FLS.**—*Staminal column* .5-.6 in. long, bearing at the top 5-6 sterile carpels round which the subsessile stamens are arranged. *Hermaphrodite* (or functionally female?) flowers:—*Carpels* sessile; style recurved, stamens (staminodes?) arranged round the base of the carpels. *Follicles* 1-5; 3-5 in. across, shortly beaked, on stout stalks 2-3 in. long, woody, minutely brown-felted outside, corky within. *Seeds* numerous, tightly packed, elliptic, compressed, 1 in. long with a white spongy terminal wing, 2-2.7 by 1.3-1.5 in.

Somewhat gregarious in evergreen forests along foot of the hills in all districts except perhaps the N. E. FRONTIER. Common near Garampani and Tikhang in SIBSAGAR and round the Dhansiri Station in NOWGONG.

A very handsome avenue tree. Wood white, soft, apparently elastic. Drums are made of the stem in Nepal. The Mikirs and Kacharis eat the seeds roasted. The fibre of the bark is sometimes used for rough cordage.

Fls. 2-4. Fr. 11-3.

Sterculia ? sp.—A tree; young parts and petiole tawny stellate pubescent. *Leaves* 5-8.5 by 1.5 in., oblong lanceolate, acuminate, entire, chartaceous, thinly millate hairy on the nerves on both surfaces, more densely pubescent on the nedrib, lateral nerves oblique about 6 on either half (excluding the basal pair); *rvules* finely reticulate; petiole 1-2 in. long, geniculate at the top; stipules small, densely pubescent, early deciduous.

lrs. & Fr. not seen.

Umlowa-KHASI HILLS.

Sterculia khasiana (King Mss) Debbarman. Nov. sp.

A medium sized tree, shoots and inflorescence ferruginous tomentose. *Leaves* 3.6-7 by 1.6-3 in., entire, subcoriaceous, elliptic or obovate lanceolate, apices shortly acuminate, somewhat narrowed towards the base, smooth; stipules .2 in. long, coriaceous, needle-shaped or lanceolate, caducous. *Racemes* apical, single at the axis, lax, rather spreading; peduncle erect, delicate. *Flowers* bracteate; bracts minute, ovate lanceolate, caducous; pedicels 3-5 in. long, erectopatent. *Calyx* lobes 5, puberulous inside; lobes 4-6 in. long, linear lanceolate, trinerved. *Petals* absent. *Staminal-column* 1 in. long, thick, reflex, smooth; anthers 10, white on sessile column of the flowers. *Fruits* not seen.

Habitat:—ASSAM, KHASI HILLS, Griffith (Date of collection and No. not known); KHASI HILLS, 1873, Rutton, (comm. C. B. Clarke, Oct. 1877, No. 21884 A & D.) (Type in Calcutta Herbarium).

2. HERITIERA, Aiton.

Evergreen trees. *Leaves* simple, entire, coriaceous, peltate, scaly beneath. *Flowers* small, 1-sexual in axillary panicles. *Calyx* segments 5, sometimes 6-7. *Petals* 0. **MALE FLS.**: *Staminal column* slender bearing a ring of 4-5 2-celled anthers at the top. **FEMALE FLS.**: *Ovary* of 5 nearly free carpels; styles short; ovules 1-2 in each carpel. *Ripe carpels* woody, indehiscent, keeled or winged. *Seeds* exalbuminous.

Leaves large; petiole over 1 in. long.

.. 1. *H. macrophylla*.

Leaves medium-sized to small, petiole under .5 in. long .. 2. *H. acuminata*.

1. *Heritiera macrophylla*, Wall. Vern. *Tepop-pomik*, Abor; *Thing-ansil*, Kuki.

A large evergreen tree, generally widely buttressed at the base when old. *Bark* dark-brown or nearly black, almost smooth, exfoliating in small square flakes, light red or nearly white inside, fibrous. *Leaves* simple, 6-18 by 2-7 in., elliptic-oblong or lanceolate, acuminate, narrowed to a sub-cordate or sub-peltate base, entire, thinly coriaceous, glabrous and dark green above, silvery beneath with stellate scales; midrib very stout, main lateral nerves 8-11 on either half, very oblique, lowest sub-basal, tertiaries slender, transverse or reticulate; petiole 1-3 in. long, geniculate at the apex, scaly. *Flowers* small, 1-sexual, pink, in axillary puberulous panicles. *Calyx* cleft to the base; segments acute. *Staminal column* slender with a crown of 4-5, 2-celled anthers at the top. *Ovary* of 5 distinct carpels of which generally only one develops into fruit. *Ripe carpel* indehiscent, globose, about 1.5 in. across, rough outside, with an obliquely set, narrow winged beak about 1.5 in. long and .3 in. broad.

A very handsome tree, found in the neighbourhood of Pasighat, N. E. FRONTIER DISTRICT.; also according to Brandis in CACHAR.

Timber hard; annual rings distinct, medullary rays uniform, joined by fine transverse lines, takes a fine polish, used for posts.

Flrs. 4-5. Fr. 9-10.

2. *Heritiera acuminata*, Wall. Vern. *Arkhar*, Lushai, Kuki; *Thing-phalem*, Kuki, *Thing-saiph*, Tipp.; *Rashwet*, Synt. *Chingren*, Naga *Bondonthuphang*, Kach.

A medium sized tree often buttressed at the base; young shoots, petioles and undersurface of leaves covered with star-like peltate brown scales which turn silvery with age. *Bark* grey and rough out-side, red inside with streaks of deeper red, inner layers lace-like. *Leaves* 2.5-7 by .8-2 in., lanceolate, oblanceolate or oblong to elliptic, acuminate, subcoriaceous or coriaceous, glabrous above, main lateral nerves 5-6 on either side, distant, upper arcuate, lowest pair basal; base acute, obtuse or rounded; petiole .25-.5 in., geniculate at the apex; stipules very small, subulate, caducous. *Panicles* axillary, much branched, densely covered with stellate tomentose scales, 1.2-4 in. long; bracts very small, caducous; pedicels up to .25 in. long, slender. *Calyx* campanulate, 4-5 lobed, lobes acute, recurved. MALE FLRS.: *Calyx* .1 in. long, staminal column slender, girt at base with a fleshy disk. FEMALE FLRS.: *Calyx* .15-.2 in. long; ovary of 4-5 distinct ridged carpels covered with scales and stellate hairs and with 2 minute staminodes between each carpel, styles red, recurved. *Ripe carpels* 2-4 together, 2-3 in. long, globose with an oblique parallel veined wing at the top, as broad as the diameter of the carpel.

CACHAR, SYLHET, KHASI and JAINTIA HILLS, North Cachar Hills ascending to about 2000 ft.

Sap wood greyish brown; heartwood red, annual rings clear; medullary rays evenly distributed, joined by fine wavy transverse lines; takes a good polish. Timber hard, used for posts and ridge plates.

Flrs. 4-5. Fr. 10-12.

Heritiera dubia, Wall.—Leaves 3-7 by 1-2.5 in., oblong lanceolate or ovate, finely acuminate, chartaceous, glabrous above, silvery lepidote beneath; base acute or abruptly rounded, 3-nerved; petiole .6-1 in. long. Flowers rusty villous in axillary panicles, 2-2.5 in. long. Staminal column fleshy. Ovary tomentose, style short, oblique, stigma 4 lobed. Fr. not seen.

KHASI AND JAINTIA HILLS—G. Gallataly (!)

Helicteres elongata, Wall.—A diffuse straggling shrub. Leaves about 3 by 1.5 in., obliquely ovate or oblong-lanceolate, thinly stellate pubescent. Flowers bisexual in axillary or terminal, many-flowered erect racemose cymes as long as or longer than the leaves; bracteoles setaceous. Calyx 5-cleft; campanulate. Petals 5, clawed. Staminal column adnate to the gynophore. Ovary 5-lobed, 5-celled; ovules several in each cell. Fruit 1-1.5 in. long, cylindric, beaked, stellate hairy in some forms, shaggy outside, of united carpels opening along their inner edge.

ASSAM. Brandis Ind. Trees.

I have seen no specimens at Calcutta.

3. ABROMA, Jacq.

Abroma augusta, Linn. Vern. *Gorukhia-korai*, Ass. (Sibs); *Vi-sipak*, Miri; *Ulat-kambal*, Beng.; *Bon-kopahi*, Ass.; (Kamrup); *Jhinuk*, *Thanthani*, Sylh.; *Theng-tyrkhum*, Khasi.

A shrub 8-12 ft. high with horizontal branches and velvety branchlets. Leaves 4-11 by 2.5-7 in., ovate or lanceolate, more or less cordate, finely acuminate, membranous, entire or repand denticulate, sometimes lobed, glabrescent above, softly pubescent or glabrescent beneath, 5-7 nerved at the base and with 4-6 main lateral nerves on either side of the midrib; petiole .5-5 in. long; stipules .2-5 in. long, linear-lanceolate, deciduous. Flowers bisexual, purple, about 2 in. diam., in leaf opposed pedunculate few-flowered cymes. Sepals 1 in. long, lanceolate, persistent. Petals imbricate, caducous with a concave claw. Staminal tube short, staminodes 5, alternating with shorter fertile stamens opposite the petals. Ovary sessile, 5 lobed, pyramidal; ovules many in each cell; styles 5. Capsule 1.5-2 in. long, obpyramidal, finely pubescent or ultimately glabrescent, truncate at the apex, membranous, 5 angled, dehiscing septicidally and at the top, valves villous at the edges forming a triangular wing behind each carpel. Seeds numerous.

In scrub forest throughout ASSAM, ascending up to 4000 ft.

The bark of the twigs yields a strong silky fibre which may be used for a variety of purposes and for which the plant is well worth cultivating in plantations. The bark of the root is a valuable emmenagogue and has also demulcent properties.

Flrs. 6-9. Fr. 8-12.

4. PTEROSPERMUM, Schreb.

Trees, scaly or with stellate hairs. Leaves simple, lobed or not, bifarious, generally nerved from the base and oblique. Flowers axillary, 2-sexual, bracteate; bracteoles often lancinate.

Calyx deeply 5-cleft. *Petals* 5, deciduous. *Staminal column* short, adnate to the gynophore, divided above into 5 groups with 20 filaments, 5 of which are staminodes, alternate with groups of three anthers. *Ovary* 5-celled, inserted within the top of the staminal column; style solitary; stigma furrowed; ovules many. *Capsule* generally woody, terete or more or less angled. *Seeds* winged at the upper extremity; cotyledons wrinkled or corrugated; albumen thin or 0.

Branchlets thick; leaves large and broad;

calyx-lobes 4-5 in. long, very fleshy;

capsule angled.

.. 1. *P. acerifolium*.

Branchlets thin; leaves small and narrow;

calyx-lobes 1.5-2 in. long, thin; capsule

terete.

.. 2. *p. lanceæfolium*.

1. *Pterospermum acerifolium*, Willd. Saus. *Karnikara*; Vern. *Tepopasing*, Miri; *Tepop-paptok*, *Sipop-using*, Abor; *Morra*, *Morugos*, Ass.; (Lakh.); *Hatipeala*, Ass. (Nowgong); *Motamarulia*, Ass. (Jeypur); *Bon-marla*, Ass. (Darr.); *Larubanda*, Ass. (Kamrup); *Modubura*, *Lai-dorhuphang*, *Lau-gongrai-baphang*, *Rangirata*, Cach.; *Kongla-arang*, *Lokong-krong-arong*, *Lopoklok-arong*, Mik. *Tuyuru-changne*, Duff.; *Kualia*, Manipur; *Hatipaul*, Nepal; *Waisil-thing*, Lushai; *Modubura*, Sylh.; *Avor*, *Ching-pha*, Tipp.; *Nakhar-theng*, Kuki; *Bhot-odla*, *Laider*, *Mech*; *Rikhabok*, *Mat-bul-japha*, Garo; *Dieng-tharo-masi*, Khasi; *Dieng-la-um-pai*, Khasi; (Nongpoh); *Dieng-myrhau*, Khasi (Tharia); *Dieng-khoh*, *Khashi* (Shella); *Dieng-khong-suet*, Khasi; (Hatmawdon). *Dieng-dit-la-khoh*, Kh.; (Nongkla.)

An evergreen tree up to 80 ft. in height and 8 ft. in girth, with a heavy broad crown; young parts and inflorescence floccose, rusty stellate tomentose. *Bark* dark-brown and rather rough outside, inside deep purplish red, variegated with streaks of white in marble-like pattern. *Leaves* 8-15 by 6-12 in.; very variable in size and shape even in the same twig, somewhat obliquely obovate or orbicular, often lobed, entire or remotely toothed, deeply cordate or peltate, coriaceous, glabrous and deep green above, grey or brownish tomentose beneath, palmately 8-10-nerved from the extremity of the petiole and with 3-6 lateral nerves on either side of the midrib; tertiary and quaternary nerves sub-parallel; petiole 4-12 in. long, striate; stipules multifid, caducous. *Flowers* solitary or in 2-3 flowered cymes, 5-6 in. across, fragrant; peduncles .5 in. long; bracteoles multifid, deciduous. *Calyx-segments* 4-5 by .3-5 in., linear, very fleshy, floccosely-brown tomentose outside, tufted villous along the middle, stellate downy on the edges within. *Petals* twistedly imbricate, a little shorter than the sepals, cuneately linear, pure white, thin. *Filaments* 1.1-1.5 in. long, filiform, glabrous, in threes against each calyx-segment, with a staminode 2-3 in. long between, all forming a tube about 1 in. long below the ovary and adnate to the gynophore; anthers .5 in. long. *Ovary* oblong, obscurely 5-angled, brown-shaggy; style simple, tapering to the club-shaped stigma,

stellate tomentose towards the base. *Capsule* 4-6 by 1.8-3.4 in., 5-celled, 5-angled, woody, floccosely brown-tomentose. *Seeds* in two rows of 8-10 in each cell, .3-.4 in. diam., rhomboid, compressed with a straight, oblong, thin, horny, shining, amber-coloured wing, 1.2-1.8 by .3-.5 in., having a thickened dorsal margin; albumen scanty, waxy; cotyledons corrugated.

Throughout the Province in mixed evergreen forests, often gregarious ascending to 2500 ft.

The heartwood being red is often smuggled as *Poma*; Weight about 48 lbs. per c. ft. The leaves are good cattle-fodder and are laid on roofs under thatch or slates in some parts of N. W. India. A plaster made of the calyx is considered infallible in glandular swellings about the neck and ears.

Figs. 4-6. Fr. 12-3.

2. *Pterospermum lanceifolium*, Roxb. Vern. *Motanahor*, *Bon-baguri*, Ass.; (Lakh. and Sibs.); *Bon-nahor*, Ass. (Darr.); *Bon-tituli*, Ass., (Kamrup); *Nahorahn*, Miri; *Theng-pituli* or *Theng-pitula-arong*, *Phong-arong*, Mik., *Pung-i-tabri*, Daff.; *Ching-nai*, Naga; *Singani*, Nep.; *Lai-kulai-phang*, Cach.; *Arkhar*, Kuki; *Sakhipelham*, Lushai; *Ban-barai*, Narcha, Sylh.; *Phaibomarta*, Tipp.; *Bol-nabat*, *Bokta*, Garo; *Dieng-nor-sha*, *Dieng-pen-siwang*, Khasi.

Usually a small or middle sized tree but occasionally up to 70 ft. in height and 7 ft. in girth, when the stem is buttressed at the base; sometimes epiphytic; branchlets thin; young parts, undersurface of leaves, petioles and inflorescence felted, with fine stellate at first rusty, ultimately buff-tomentum. *Bark* greyish green and rough outside, inside reddish with white vertical streaks which soon turn reddish-brown. *Leaves* 2.5-6 by 7-1.5 in., lanceolate oblong or obovate-oblong, finely acuminate, entire or obscurely repand in the upper half, glabrous and shining above, midrib stout; main lateral nerves 5-7 on either half, slender, oblique, tertiaries parallel, transverse to the midrib, ultimate nervules (visible only when the leaf is held against the light, and fully mature) finely reticulate; base more or less oblique, rounded or sub-cordate, sometimes very narrowly peltate; petiole .1-2 in. long; stipules .2-3 in. long, subulate with 2-4 filiform branches, .1-.25 in. long, caducous. *Flowers* 2-3 in. across, pale-white, fragrant; buds oblong-lanceolate, 5-ridged; peduncles 1.7-2 in. long, 1-flowered with 1 or 2, 2-5 fid bracteoles. *Calyx-segments* 1.3-1.6 by .15-.2 in., brown tomentose, outside white or grey with adpressed, stellately tufted hairs and fine tomentum within. *Petals* white, membranous, slightly longer and wider than the calyx-segments, tapering towards the base. *Stamens* about 1 in. long, including the linear anthers; gynandrophore about .15 in. long. *Ovary* gradually narrowed to the ribbed simple style, buff-tomentose. *Capsule* 2.5-3 by 1-1.7 in., lanceolate, terete, woody buff-felted outside, 5-celled, each cell with about 4 seeds. *Seeds* about .3 in. diam., orbicular, compressed with a terminal wing-like that of the preceding species but shorter and somewhat tapering.

Common specially in mixed scrub forests, ascending to about 2000 ft. Wood moderately hard with numerous and close undulating medullary rays, but is not much used. The Daflias chew the leaves to redden their lips. Squirrels seem to be fond of the bark.

Flrs. 4-6, Fr. 10-6.

Dterospermum Blumeanaum, Korth.—A tree 40-50 ft. in height; branchlets covered when young with scurfy deciduous rusty stellate hairs. *Leaves* 3-5.5 in. by 1.35-2 in., very unequal sided, oblong to ovate or lanceolate oblong, entire or with a few coarse teeth towards the apex, acuminate, one side of base often subauriculate, densely brown tomentose when young, glabrous and dark green above, minutely tawny or brown tomentose beneath, with many brown stellate hairs specially on the nerves beneath, lateral nerves 5-7 on either half, prominent beneath; petiole short; stipules subulate, lanceolate. *Flowers* 2-3 in. long, axillary, solitary or in few flowered cymes. *Buds* cylindric, acute, about 2 in. long; sepals narrowly linear, acute, scurfy, stellate pubescent outside, silky within. *Petals* membranous, oblong-lanceolate or subspathulate, shorter than the petals. *Fertile stamens* about 10; staminodes 5. *Ovary* villous, 5-celled; style shorter than the staminal tube, glabrous. *Capsule* 3-4 in. long, woody, oblong, 5 angled, subacute, slightly narrowed towards the base.

According to Brandis (Ind. Trees) occurs in Assam. There are no specimens at Calcutta from our area.

Firs. 4. Fr. 6.

5. REEVESIA, Lindl.

Reevesia Wallichii, Brown.

A medium-sized tree attaining about 50 ft. with grey and somewhat smooth bark exfoliating in round flakes, inner substance soft, cream-coloured. *Leaves* simple, 2.7-6.5 by 1.5-3 in., ovate, ovate-oblong, acuminate, coriaceous, entire, glabrous above, sparsely stellate pubescent beneath, main lateral nerves 6-8 on either half, lowest pair basal, base obtuse or rounded; petiole .5-1.5 in. long, geniculate at the apex; stipules early deciduous. *Flowers* white, fragrant, bisexual, in corymbiform panicle of cymes, usually shorter than the leaves; panicles terminal or from axils of fallen leaves; pedicels jointed, 2 bracteolate. *Calyx* ultimately 5-fid, .15 in. long, persistent. *Petals* spathulate, clawed, exceeding the calyx. *Staminal column* exceeding the petals, adnate to the gynophore and bearing a globose head of anthers in 5 bundles of 3 each. *Ovary* 5-lobed with 2 ovules, in each carpel; stigma subsessile, 5-lobed. *Carpels* pubescent. *Capsule* 1.5-2 in. long, obovoid oblong, brown velvety outside, 5-celled, grooved between the cells, valves woody, dorsally slightly keeled, dehiscing septicidally and ultimately along the backs of carpels. *Seeds* 1-2, .8-1.2 in. long in each cell, winged downwards; wing membranous with brown veins, oblong, .6-8 in. long, albuminous.

KHASI AND JAINTIA HILLS, 3500-4500 ft.

Flrs. 4. Fr. 12-2

6. BUETTNERIA, Linn.

Généally climbing shrubs with palmately nerved leaves. *Flowers* bisexual, 5-merous, small, in much branched umbellate cymes. *Sepals* connate at the base. *Petals* with a concave claw and with two lateral lobes. *Anthers* 5, extrorse, seated on a more or less

truncate staminal tube, opposite the petals and alternating with 5 staminodes which are opposite the sepals. *Ovary* sessile, 5-celled with 2 ovules in each cell. *Capsule* septicidal, globose, echinate, 5-celled, with one seed in each cell. *Seeds* exalbuminous; cotyledons spirally rolled.

Leaves chartaceous, entire, glabrate and shining above; capsule armed with stout conical prickles.

.. 1. *B. aspera*.

Leaves membranous, serrulate, more or less pilose above; capsule covered with wiry thin barbed bristles.

.. 2. *B. pilosa*.

1. **Buettneria aspera**, Colebr. Vern. *Tikom-borua*, Ass. (Sibs.); *Risul-rubi*, Miri & Abor; *Warpokhu*, Mik.; *Pira-doukha*, Kach.; *Jong-long-rhui*, Lushai; *Lata-kuti*, Dusi-phri, Garo; *Ther-un*, Tille-sa-phai, Mei-klong, Mei-slah, Khasi.

A large woody climber with sulcate branchlets; young shoots and inflorescence grey or buff stellate pubescent. *Bark* dark-brown closely longitudinally or spirally furrowed on old stems. *Leaves* 4-8 in. diam., orbicular, cordate, abruptly acuminate, entire or obscurely repand, chartaceous, glabrate and shining above, puberulous along the nerves beneath, bright pink when young; midrib with one or more large glands near the 5-7 nerved base and 5-6 regularly arched lateral nerves; tertiary sub-parallel and transverse to the secondary nerves; ultimate nervules very fine and closely reticulate; petiole 2-5 in. long, sulcate, puberulous; stipules 5 in. long, linear lanceolate, early deciduous. *Flowers* pale brown, 1.5-2 in. diam., buds ovoid or pyramidal; pedicels slender, 1.3-1.5 in. long, jointed in the middle, cymosely umbelled on the ultimate ramifications of peduncled cymes; inflorescence up to 5 in. long; peduncles fascicled, axillary, up to 2 in. long; bracts and bracteoles subulate. *Petals* shorter than the sepals, terminal lobe fleshy, acute, lanceolate. *Capsule* 1-1.5 in. across, globose, woody, armed with stout sharp rather distant conical prickles. *Seeds* ovate oblong, solitary in each cell, immersed in watery sap, unarmed.

Fairly common in mixed evergreen forests throughout UPPER ASSAM and also NAGA HILLS ascending up to 2500 ft.

Young parts and bark macerated are used by Mikirs and Khasi women to wash the hair.

Flrs. 5-6 Fr. 11-3.

2. **Buettneria pilosa**, Roxb. Vern. *Dim-soh-doukha*, *Dum-shoh-doukha*, Cach.; *Manlang-rang*, Kuki; *Jirmi*, Khasi.

A large woody climber; branchlets grooved, at first densely pubescent, afterwards more or less strigose. *Leaves* 4-7 by 2.5-6 in., orbicular or ovate, cordate, abruptly acuminate often more or less distinctly 3-5 lobed, closely serrulose-denticulate, membranous, somewhat harshly stellate-pubescent, 7-9 nerved at the base and with 3-5 lateral nerves on either side of the midrib, other nerves as in the preceding species; petiole 2-8 in. long, shaggy while young. *Flowers* yellowish, about 2 in. across; in much branched

pubescent compound cymes; bracteoles subulate, pedicels capillary several together on ultimate^b cymose umbels; petals shorter than the sepals, terminal lobe linear lanceolate; anthers yellow, spreading. *Capsule* spherical, .6-.8 in. diam., densely covered with barbed bristles.

In the lower hills or not far from the foot of the hills in SIBSAGAR (Barpathar, Naojan) and NOWGONG (Lumding, Amguri, Doboka).

Flrs. 10-11. Fr. 12-4.

Dombeya Mastersi, Hk. f. A large branchy shrub. *Leaves* 4-6.5 in. across, orbicular cordate, often obscurely 3 lobed, acuminate, thinly pubescent above, soft hairy beneath, palmately 7-9 nerved, crenate-dentate; petiole 1.5-3 in. long, villous like the pedicels and peduncles with long spreading hairs. *Flowers* white, 1-1.5 in. across in many flowered, axillary, peduncled umbels; peduncles up to 1.5 in. long, sometimes forked towards the top, each branch bearing an umbel with a solitary flower in the fork; pedicels slender, 1-1.5 in. long, surmounted by an epicalyx of 3 deciduous, linear lanceolate, acuminate bracteoles about .75 in. long. *Sepals* .5 in. long, lanceolate, valvate, reflexed in flower. *Petals* .7-1 in. by .45-.5 in. oblique, imbricate. *Staminal tube* short, nearly enclosing the ovary; stamens in bundles of 3 with an interposed petaloid staminode having pinkish base, and linear ligulate limb which is longer than the stamens. *Ovary* densely villous; style free at the apex. *Capsule* 5 celled with papery valves; seeds rugose.

A native of TROPICAL AFRICA. Cultivated in public gardens in Shillong.

Flrs. 1-2.

FAM. 25. TILIACEÆ.

Trees, shrubs or herbs; bark usually mucilaginous and with strong fibres. *Leaves* alternate, simple or lobed, generally mucilaginous; stipules free. *Flowers* regular, 2-sexual or rarely 1-sexual, usually cymose. *Sepals* 3-5, free or connate, valvate. *Petals* as many as the sepals, rarely absent. *Stamens* indefinite, rarely few, free or connate, frequently inserted on a gonophore; anthers introrse dehiscing by lateral slits. *Ovary* free, 2-10 celled; ovules 1-many on axile placentas; style simple, or parted into as many divisions as cells in the ovary, or 0; stigmas terminal. *Fruit* baccate or capsular, 2-10-celled or spuriously many-celled, rarely 1-celled by abortion. *Seeds* solitary or many; albumen generally copious; embryo straight, usually with leafy cotyledons.

Fruits not winged:—

Trees or shrubs; fruit drupaceous.

... 1. *Grewia*.

Herbs or undershrubs; fruit capsular:—

Petals glandular at base, capsules

prickly or bristly.

... 2. *Triumfetta*.
Corchorus.

Petals not glandular, capsules unarmed.

Fruits winged:—

A tree. *Leaves* alternate.

... 3. *Columbia*.

A climber. *Leaves* opposite.

... 4. *Plagiopteron*.

1. GREWIA, Linn.

Trees or erect or sometimes straggling or climbing shrubs, usually stellate-pubescent. *Leaves* alternate, usually distichous,

often inequilateral, more or less toothed, with 3-7 basal nerves. *Flowers* generally yellow, less often white, in axillary, extra-axillary or terminal fascicles, cymes or panicles, sometimes solitary. *Sepals* 5, distinct, coriaceous, more or less coloured within. *Petals* 5, usually with a glandular scale* at the base within, generally much shorter than the sepals, sometimes wanting. *Stamens* indefinite, free, all fertile, inserted on a stout gonophore when the petals are glandular. *Ovary* 2-4 celled; style subulate. *Fruit* a drupe, more or less fleshy, entire or lobed; seed albuminous; cotyledons flat.

I. *Tices.*

Flowers involucrate and paniced.

Flowers in axillary umbels which are generally fascicled:—

Leaves oblong or ovate, more or less cordate, densely tomentose beneath. Flowers yellow.

Leaves lanceolate, acute at the base, glabrescent. Flowers white.

II. *Erect or straggling shrubs or undershrubs:—*

A. Leaves softly tomentose, pubescent or glabrescent, never rough:—

1. Leaves broad, 5-nerved at the base:—
Flowers yellow, drupe scarcely lobed.
Undershrub with a thick underground root-stock and annual shoots.

2. Leaves narrow, 3-nerved at the base:—
Leaves nearly glabrous, green on both surfaces. Flrs. bisexual, white.
Leaves hoary beneath. Flrs. polygamous, yellowish.

B. Leaves rough on one or both surfaces:—

1. Erect shrubs or undershrubs; peduncles never exceeding the petioles:—

Leaf 3-nerved at the base, thin; more or less lobed, fleshy, rind not crustaceous. Shrub with persistent shoots

Leaf 3-5-nerved at the base, thick, rind crustaceous, undershrub or shrub, usually with annual shoots from a woody rootstock, drupe not lobed, rind crustaceous.

2. Straggling shrub; peduncle exceeding the petiole; drupe not lobed.

1. *G. Microcos.*

2. *G. elastica.*

3. *G. Lavigata.*

4. *G. sapida.*

5. *G. multiflora.*

6. *G. hirsuta.*

7. *G. abutilifolia.*

8. *G. sclerophylla.*

9. *G. denticulata.*

1. *Grewia Microcos*, Linn. Vern. *Pisoli*, Ass.; *Theng-pranke-arong*, Mik.; *Heitup*, Manip.; *Bolchibins*, Borsubret, Garo *Lakhul-guta*, Koi-pura, Pipi, Jharna; *Phisiula Pesondi*, Sylh. *Dieng-soh-dkhar*, *Dieng-soh-lieng-hadem*, Khasi.

A deciduous (?) tree up to 50 ft. in height and 5 ft. in girth; trunk often fluted; young shoots patently pubescent. *Bark* dark-brown or nearly black outside, exfoliating in thin flakes, finely fibrous, pink or red and in more or less distinct concentric layers near the cambium, fainter outward and variegated with brown or greenish-grey and leathery. *Leaves* bifarious, 3-7.5 by 1-3.5 in., ovate, oblong, obovate-oblong or lanceolate, serrulate or nearly

* The gland may sometimes be present or absent in one and the same species. Its presence appears to be correlated with the length of the gonophore.

entire, chartaceous, glabrescent but the petiole and main nerves are seldom wholly glabrous; main lateral nerves 6-7 on either side of the midrib, the lowest pair basal; base rounded, or sometimes cordate, more or less oblique; petiole '25-6 in. long, terete; stipules more or less falcate, linear-lanceolate, '25-5 in. long. *Flowers* pale-yellow in heads of 3, supported by involucreal bracts which are '25-3 in. long, lanceolate, coherent at the base and puberulous outside; heads pedunculate and arranged in terminal panicles 3-6 in. long. *Sepals* obovate-oblong, cream-coloured, about 3 by 1 in., hooded, pubescent. *Petals* about 1 in. long, cream coloured, somewhat reddish on the back, glands about half the petals, slightly ciliate. *Filaments* shorter than the sepals. *Gonophore* and *ovary* glabrous, the former with a wooly fringe at the top. *Drupe* globose about 3 in. across, smooth, glabrous; stone enveloped in a matted sac of strong fibres.

KAMRUP, NOWGONG, CACHAR, N. CACHAR HILLS, SYLHET, KHASI & JAINTIA HILLS, GOALPARA, GARO HILLS ascending up to 2000 ft., in deciduous forests.

Wood light-red, weighing about 50 lbs. per c. ft. seldom used except for firewood. In Burma leaves used for covering cigars for which it is considered to be the best leaf.

Flrs. 5-6. Fr. 11-1.

2. *Grewia elastica*, Royle. Syn. (*Grewia vestita*, Wall. Incl. (†. *asiatica*, Linn. Var. *vestita*, F. B. I., Vern. *Man-bijal*, Ass. (Now); *Byul-goch* Ass. (Kam.); *Phuhwa*, Ass. (Darr.); *Thusura*, Mech; *The-bong-dar-arong*, *Bong-der-so-arong*, Mik.; *Laiman-phang*, *Mikir-lata-phang*, *Thai-a-dou*, Cach.; *Sial-phosra*, Nep.; *Thai-girip-theng*, Kuki. *Bor-khentri*, *Khungshriwakhik*, Garo; *Dhamna*, Jharua-Garo Hills; *Dieng-sok-langhri-that*, Khasi; *Dieng-tha-ballieh*, Khasi (Nongpoh).

A deciduous tree up to 60 ft. in height and about 5 ft. in girth; young parts densely grey-felted. *Bark* greyish-white on old stems exfoliating in hard rectangular pieces; inside whitish mottled with thick irregular pink streaks but soon turning deep brown obliterating the streaks. *Leaves* 3-5 by 2-2.5 in., obliquely ovate, oblong-ovate or elliptic, sometimes obscurely 3-lobed, acuminate, closely crenata-serrate, thinly coriaceous, dark-green and hispid with stellate hairs above, pale and softly felted beneath, pink when very young, basal nerves 5-6, nearly straight; lateral nerves 3-4 on either side of the midrib, tertiaries transverse, parallel; petiole 2-4 in. long; stipules subulate, 3-4 in. long. *Flowers* yellow, in fascicled or rarely solitary axillary cymes; peduncle 3-5 in. long, downy, each bearing 2-3 bracteolate flowers; bud globose to ovoid, not or very obscurely ribbed; pedicels 3-4 in. long. *Sepals* 2-5 in., linear-oblong, yellow inside. *Petals* yellow, oblong, much shorter than the sepals. *Stamens* numerous; filaments yellow, slender, glabrous. *Ovary* villous; style equalling the stamens or slightly exceeding them. *Drupe* globose, 2-3 in. across, sometimes obscurely 2-4 lobed, slightly hairy, blackish when ripe.

In deciduous forests in DARRANG and NOWGONG, KAMRUP, N. C. HILLS, SOALPARA, KHASI & JAINTHIA HILLS ascending up to 3000 ft.

Wood, grey, close grained, tough and elastic, used in other parts of India for bows, spear-handles, banghy-poles, etc.; weight about 50 lbs. per c. ft. The branches are lopped for fodder and the ripe fruit is edible. The bark yields a strong fibre suitable for ropes.

Firs. 4-5. Fr. 9-11.

3. *Grewia disperma*, Rottl. Syn. *Grewia laevigata*, Vahl. Vern. *Sernam-longda*, *Theng-rom-pa*, *Rampak-arong*, Mik.; *Khau-khlem-maising-phang* or *Khau-khlem-marsi*, *Mithang-Samja*, Cach.; *Gangthi*, Sylh.; *Bol-mengu*, Garo; *Thing-nhap-khir*, *Wai-thel-te-thing*, Kuki; *Dieng-doh-thli*, Khasi; *Dieng-tier-ser*, Khasi (Shella); *Dieng-tiew-sat*, Khasi (Tharia).

A small tree but sometimes up to 45 ft. in height and 3 ft. in girth; young shoots glabrous or nearly so. Bark thin, dark-grey or brown outside, uniformly cream-coloured inside. Leaves 3-7 by 1-2.4 in., green on both surfaces, oblong-lanceolate, acuminate, acute and 3-nerved at the base, glandular-serrate, membranous, glabrous or glabrescent; lateral nerves about 6 on either side of the midrib, slightly arched, basal almost straight, tertiaries transverse, very slender; petiole .3-.5 in. long, glabrous; stipules subulate, shorter than the petals. Flowers 1-1.5 in. across, in 3-flowered axillary cymes; buds oblong, ribbed; peduncles .8-1.2 in. long, slender, 1-3 in each leaf axil; pedicels nearly as long as the peduncles. Sepals .6-1 in. long, linear-oblong, fleshy, 2-ribbed, green outside, white within. Petals .1-1.5 in. long, white, membranous, entire, tapering to the apex, claw dilated, gland exceeding half the petal. Ovary villous; style glabrous; stigma lacinate. Gonophore elongated, villous at the top. Drupe .25-.3 in. diam., 1-4 lobed, rugose when ripe.

In mixed scrub in all districts excepting LAKHIMPUR and the N E FRONTIER ascending to 3000 ft.

The leaves are used for fodder. The wood gives an offensive smell when burnt and is therefore carefully avoided as firewood for cooking purposes. The bark yields a good fibre which is suitable for cordage.

Fls. 9-10. Fr. 11-12.

4. *Grewia sapida*, Roxb. Vern. *Phuhura*, *Thaura-guti* (the fruit), Ass. (Darr.); *Bong-der-so-arong*, Mik.; *Pumi-aye*; Miri.

A prostrate undershrub with a perennial woody rootstock throwing out annually a number of switchy shoots, which after producing leaves, flowers and fruit, are burnt or browsed down to be similarly renewed next year; young shoots shaggy. Leaves 2-4 by 1.5-3 in., ovate, obovate, obovate-oblong or orbicular, usually doubly serrate, sometimes obscurely lobed, apex rounded or broadly acute, pilose or scabrid above, softly pubescent beneath; base usually 5-nerved, oblique; petiole .2-.3 in. long, grey-shaggy; stipules .3 in. long, subulate, subsistent. Flowers 4-6 in. across, yellow, 2-5 on each peduncle; peduncles 2-5 in each leaf-axil, .7-1.5 in. long, slender, hairy; pedicels .5-.8 in. long; bud obovoid, tomentose. Sepals reddish-brown inside,

oblong or oblanceolate. *Petals* yellow, elliptic, entire, often emarginate at the apex. *Drupe* 2-8 in. diam., obscurely lobed, hirsute.

In large open dry grass-lands in all the DISTRICTS ascending to 2500 ft. A favourite fodder plant. The ripe fruit is edible.

Flrs. and Fr. 5-5.

5. *Grewia multiflora*, Juss. Vern. Kukur-huta, Ass.; Barbi-ang, Miri; Singnam-longlak, Mik.; Papu-tadu-changne, Duff.; Mithaichora, Pura-koroi, Sylh.; Dieng-tyrbhong, Khasi; Dieng-tiewsier, Khasi (Hatmawdon).

A bushy shrub which often becomes procumbent with very small leaves due to excessive browsing; bark dark-brown outside, thin; white inside; branches thin; sparingly strigose. *Leaves* very variable in size and shape, irregularly distichous, 1.5-4 by .5-1.5 in. elliptic-lanceolate, acuminate, rounded or subacute at the base, glandular serrate, chartaceous, glabrescent, dark-green shining above; lateral nerves 5-6 on either half, the lowest sub-basal; petiole .15-.2 in. long, slender, strigose; stipules 1-2 in. long, subulate. *Peduncles* .5-.8 in. long, 3-flowered; pedicels nearly as long or longer. *Flowers* white, small; buds obovoid, ribbed. *Sepals* 3-5 in. long linear-oblong. *Petals* half the length of the sepals, entire. *Filaments* short. *Gonophore* glabrous with a fringe of hairs at the top. *Drupe* 1-4 lobed, about .2 in. across, globose, black or purplish, fleshy, glabrescent.

Throughout UPPER ASSAM. Very common in SIBSAGAR and the MIKIR HILLS.

The lac insect is reared on this plant and for this purpose it is often planted near homesteads in the Mikir Hills.

Flrs. 8-9. Fr. 9-11.

6. *Grewia hirsuta*, Vahl. Var. *helictrofolia*, Wall (Sp) Syn. G. *polygama*, Masters, not of Roxburgh.—Vide Journal of Botany Vol. XLIX P.356 et. seq. Vern. Hukta-pata, Ass.; Soh-synting, Khasi.

A spreading shrub attaining about 9 ft. with annual or periodic shoots; young parts and inflorescence pubescent. *Leaves* 2-5 by .4-.9 in., narrow lanceolate or oblong, acute or acuminate, closely toothed, stellate pubescent or glabrate above, grey or tawny tomentose beneath; lateral nerves (excluding the basal) 4-6 on either side of midrib; base rather oblique, usually 3-nerved; petiole up to .15 in. long; stipules subulate up to .2 in. long. *Flower* yellow, polygamous. *Peduncles* axillary, 1-5 together, 2-6 flowered, up to .5 in. long, but usually much smaller; pedicels up to .4 in. long; bracts subulate; buds obovoid, ribbed tomentose. *Sepals* linear-oblong, up to .4 in. long, usually with a tuft of hairs at the base inside. *Petals* obovate oblong, much shorter. *Stamens* many, usually exceeding 20; gonophore villous at the top, in male flowers, stamens much exceeding the hairs; in hermaphrodite flowers, stamens about as long as the hairs or slightly longer. *Ovary* villous. *Drupe* 2-4 in. across, reddish brown and shining when ripe, rind crustaceous, covered with a few scattered hairs or glabrous when ripe, usually with 1-4 lobes.

Grass lands KAMRUP and KHASI and JAINTIA HILLS in lower elevations ; probably also in other similar forests.

A very variable plant. Roxburgh's plant does not appear to be this species.

The fruit is edible and roots are considered to be tonic in Hindu medicine and the fruits are used in cases of diarrhoea and dysentery.

Frs. rainy season. Fr. 11-1.

7. *Grewia abutilifolia*, Juss. Syn. (*G. aspera*, Roxb. Vern. *Soh-cit-blang*, Kh. ; *Bipo-bum-the-arong*, Mik. ; *Bon-dusa-phang*, Cach.

A bushy shrub up to 10 ft. high with more or less smooth grey bark about .3 in. thick, blaze red with white streaks ; young parts and inflorescence rough stellate tomentose. *Leaves* 4.5-8.5 by 2.5-6 in., broadly elliptic, elliptic ovate or suborbicular, sometimes lobulate, short acuminate, irregularly serrate, chartaceous when mature, rough stellate hairy on both surfaces, more densely beneath ; lateral nerves 5-6 (above the basal) on either side of midrib, nervules finely reticulate ; base 3-nerved, rounded ; petiole .4-6 in. long, densely tomentose ; stipules subulate, adpressed hairy. .3-1 in. long. *Peduncles* very short, 1 or more from leaf axils, 3-4 flowered ; bracts caducous, lanceolate, .25-.3 in. long ; bracteoles linear, short ; pedicels up to .2 in. long, elongating and stout in fruit ; buds ellipsoid. *Sepals* .4-7 by .1-1.5 in., narrow oblong, glabrous, white, turning yellow and glabrous inside. *Petals* much shorter than the sepals, rounded at the apex, gland about half the length of the petal. *Filaments* white, very slender. *Ovary* villous ; style exceeding the stamens ; stigmas lobed. *Gonophore* glabrous with tufted hairs at the top. *Drupe* slightly 2-4 lobed. .4-.5 in. across, depressed, turbinate with scattered bristle-like deciduous hairs, fleshy.

NOWGONG-Sonakusi reserve ; N. CACHAR HILLS ; KHASI and JAINTIA HILLS—Barnihat, ascending to about 1000 ft.

Frs. 4-5. Fr. 10-1?

8. *Grewia sclerophylla*, Roxb. Syn. *G. scabrophylla*, Roxb.

A shrub or an undershrub ; young parts, petiole and inflorescence densely brown, rough stellate tomentose. *Leaves* 1.5-8 by 2.5-5 in., elliptic ovate or obovate to suborbicular, irregularly toothed, larger teeth often glandular at the tip, rather thick, rough above, stellate tomentose beneath ; lateral nerves (excluding the basal) 5-6 on either side of the midrib, slightly arcuate ; base 3-nerved, rounded or obtuse ; petiole .3-.6 in. long, often with one or more glands at the top ; stipules subulate, up to .4 in. long. *Peduncles* short, 1-few on leaf axils, each 2-3 flowered ; pedicels stout, about .5 in. long. *Buds* .4-.5 in. long, oblong, ribbed. *Sepals* .5 in. long, oblong, yellow inside ; petals half the length of sepals, obovate, notched at the apex, gland villous on the edges about a third of the petal. *Ovary* villous ; style peltate, slightly exceeding the stamens. *Gonophore* glabrous, villous at the top and with tufts of hair between the petals at the base. *Drupe* globose, depressed at the top, .5-.8 in. across, rough stellate hairy, with a crustaceous rind and sweet viscid pulp, stones usually 4.

KAMRUP, GOALPARA, NAGA HILLS, lower elevation in KHASI HILLS, probably also in other areas in grass lands. Often burnt every year and then becoming very stunted with a woody rootstock.

The fruit is edible and the stem yields good fibre.

Frs. 5-9. Fr. Autumn.

9. *Grewia denticulata*, Wall. Ann. Roy. Bot. Gard. Calc. IX. 10. t. 12. Syn. G. *nagensium*, Prain, Journ. As. Soc. Beng. Vol. LXIX. 2. 168.

A straggling shrub with terete branches, young shoots harsh with stellate hairs. *Leaves* bifarious, 4-7 by 2-3.2 in., ovate-or oblong-lanceolate, acuminate, subequally closely serrate, chartaceous, hispidly stellate-pubescent, sparsely above, densely beneath, especially along the nerves; lateral nerves 4-6 on either side of the midrib; base rounded, 3-nerved; petiole terete, .2-.3 in. long, densely rusty stellate pubescent. *Flowers* white (fading to yellow?) in peduncled umbellate scabrid cymes; peduncles .4-1 in. long, stout; pedicels .6-.8 in. long, dilated upwards, elongating in fruit; bracts triangular, lanceolate, .2 in. long, stellate hairy outside. *Sepals* .4-.5 in. long, lanceolate. *Petals* about .2 in. long, ovate, the large basal gland occupying nearly the whole of the lower half. *Gonophore* adpressed villous. *Ovary* pubescent. *Drupc* 2-1, sometimes 3-lobed, globose but somewhat compressed, about .3 in. across, rugose with the lenticular bases of fallen stellate hairs.

SIBSAGAR, Derol Reserve; Jaipur, Borian, etc., LAKHIMPUR.

Fls 8-9. Fr. 11-1.

2. TRIUMFETTA, Linn.

Herbs or undershrubs with stellate pubescence. *Leaves* usually serrate or dentate, sometimes lobed. *Flowers* yellow, in dense cymes which are axillary or leaf-opposed or imperceptibly pass into terminal spike-like inflorescence. *Sepals* 5 distinct. *Petals* 5, glandular and ciliate at the base. *Stamens* 5-many. *Ovary* 2-5 celled, cells 2-ovuled; style filiform. *Capsule* subglobose, with more or less hooked spines or bristles. *Seeds* pendulous, albuminous.

Upper leaves ovate or lanceolate; capsules .6-1 in. across (including the spines):-

Spines of capsules long, hispid.

... 1. *T. pilosa*.

Leaves rhomboid, more or less lobed; capsule .25-3 in. across (including the spines):-

Spines of capsules short, glabrous.

... 2. *T. rhomboidea*.

1. *Triumfetta pilosa*, Roth. Vern. *Soh-bythrid*, Kh.

A perennial herb or undershrub with a woody base and hispid stems; young parts rusty tomentose. *Leaves* 2.5-5 in. long, very variable, lower often lobed, upper ovate-lanceolate, acuminate, unequally serrate, membranous, pubescent above, tomentose beneath; base usually 5-nerved, rounded or subcordate; lower petioles up to 1.8 in. long, upper short; stipules obliquely lanceolate or linear, .25 in. long. *Flowers* .2-.3 in. long in

congested lateral cymes, much shorter than the leaves. *Stamens* 10. *Ovary* covered with short scales. *Capsule* .6-1 in. across, spines 2-.35 in. long, slender, hooked, patently hispid in the lower half.

Grass lands in SIBSAGAR, NAGA HILLS, KHASI HILLS ascending to 4500 ft., probably in similar localities in all dists.

Flrs. 7-9. Fr. 9-11.

T. cana, Bl.-*Leaves* ovate-oblong or lanceolate, 2-4.5 in. long, upper smaller. *Flowers* .15-2 in. long in tomentose extra-axillary cymes. *Capsule* about .6 in. across, globose, spines hispid. Scarcely more than a variety of the last.

KHASI and JAINTIA HILLS about 5000 ft.

Flrs. 7.

T. tomentosa, Boj. *Leaves* 2-5 in. long, ovate lanceolate, upper narrower. *Stamens* 5-7. *Capsule* not exceeding .6 in., appears to be a tomentose state of *T. pilosa*.

SYLHET (Wallich) and probably in most localities where the latter is found.

2. *Triumfetta rhomboidea*, Jacq. *Jhinjharita*, Sans. *Agra*, Ass.; *Sok-hyr-thit*, Kh.; *Bolnghas*, Nep.; *Northe-arong*, Mik.

Herbaceous or suffrutescent up to 6 ft. high. *Lower leaves* usually 3-lobed, 2-3 in. across, cordate, irregularly serrate, rounded or cuneate at the base, membranous, upper leaves smaller and narrower, not lobed; petiole 1-1.5 in. long, hairy, swollen at the junction with the blade. *Flowers* .3 in. long in dense leaf-opposed and terminal cymes. *Sepals* hooded at the apex. *Petals* shorter than the sepals. *Stamens* 10-15. *Capsules* .25 in. across, villous between the spines; spines about .1 in. long, glabrous, hooked, sharp pointed.

Very common along road sides, jhums and abandoned village sites in the plains of ASSAM, NAGA HILLS.

Flrs. 8-11. Fr. 9-12.

CORCHORUS, Linn.

Herbs or undershrubs. *Leaves* simple, serrate, the lower pair of teeth usually much prolonged into filiform appendages. *Flowers* small, yellow, bracteate. *Sepals* 4-5. *Petals* 4-5, not glandular at the base. *Stamens* generally numerous, on a short torus. *Ovary* 2-5 celled; ovules many in each cell; style short. *Capsule* elongated or subglobose, echinate or muricate, usually beaked. 2-5 valved, sometimes transversely septate between the seeds. *Seeds* numerous.

The following two species are cultivated in SIBSAGAR, LAKHIMPUR and DARRANG for jute fibre and their cultivation is gradually extending throughout ASSAM.

Capsule globose, muricate and ridged, not beaked; cells not transversely septate.

.. 1. *C. capsularis*.

Capsule elongate, glabrous, 10-ribbed, beaked; cells transversely septate.

.. 2. *C. olitorius*.

1. *Corchorus capsularis*, Linn. Vern. *Tita-mura-pat*, Ass.; *Nalita*, *Nalita-pat*, Beng.-The leaves of this species are bitter and are used as a bitter tonic, and dried leaves are kept in households in E. BENGAL for this purpose. This species is more generally cultivated in Assam than *C. olitorius*. Two varieties are ordinarily recognized, one being larger plant than the other.

2. *Corchorus olitorius*, Linn. Vern. *Mura-pat*. Ass. ; *Pat*, *Koshla*, Beng. The fruit characters given above in the analysis are sufficient to distinguish it from the foregoing species. The leaves are mucilaginous, sweetish, and are used as a spinach.

In Watt's Dictionary of Economic Products most of the remarks as to the use of the leaves of these two plants have been mixed up.

Much of the wealth of rural E. BENGAL is due to these two plants which yield the rûle of commerce and are very extensively cultivated for the fibre.

3. COLUMBIA, Pers.

Columbia floribunda, Wall. Vern. *Arlak-pi*, Mik. ; *Bra-rayang-phung*, Kach. ; *Khasre*, Nep. ; *Thaltre*, Lush. ; *Antha-thung*, Kuki ; *Larnbunda*, Ass. (Kamrup).

A deciduous tree up to 50 ft. in height and 3 ft. in girth ; stem fluted ; all young parts more or less scabrid with short stellate hairs. *Bark* grey and rough outside, reddish-brown or cream coloured inside, with broad streaks of lighter tissue, turning deeper brown on exposure, 3-5 in. thick, finely fibrous, in thin concentric layers, scarcely mucilaginous. *Leaves* 4-6 by 3-7 in., upper small, rotundate ovate or obovate-oblong or sub-orbicular, acute or subacute, often shortly lobed, irregularly gland-toothed, subcoriaceous, rugulose and scabrous on both surfaces, minutely punctate beneath ; lateral nerves 3-5 on either side of the middle nerve ; base rounded or slightly cordate, 5-7 nerved ; petiole .7-2.2 in. long, swollen at the apex, scabrid. *Flowers* small, in few fld. clusters ; clusters arranged in lax terminal panicles or shorter peduncles from upper leaf axils ; bracts leaf-like ; pedicels slender, pubescent. *Sepals* 5, distinct, red inside, .1 in. long. *Petals* 5, oblong-spathulate, as long or longer than sepals, yellow with scarlet dots, each with a small glandular cavity at the base. *Stamens* numerous, free on a raised torus. *Ovary* 3-5 celled, each cell 2-4 ovuled. *Capsules* .6-.9 in. across, of 3-5 indehiscent, 2-winged, pubescent, usually 1-seeded cocci ; wings venose. *Seeds* albuminous ; cotyledons flat.

A rather handsome tree with a gregarious tendency. Nichuguard and Dimapui, SIBSAGAR ; Lumding, Doboka, Amguri, etc., NOWGONG, USHAH HILLS ; NORTH CACHAR HILLS ; NAGA HILLS.

Frs. 6-8. Fr. 11-1.

4. PLAGIOPTERON, Griff.

Plagiopteron suaveolens, Griff.

A very large woody climber. *Bark* brownish grey with shallow fissures outside, dull white with oval brownish patches inside ; young parts stellate pubescent. *Leaves* opposite, 4-6 by 2.5-3.5 in., elliptic to obovate, abruptly acuminate, entire, glabrous or slightly puberulous along the midrib underneath, nerves raised underneath, main lateral nerves 5-6 on either side, lowest pair basal, upper arcuate, tertiaries transverse to the secondaries ; petiole more or less stellate pubescent, 3-5 in. long ; stipules short, linear,

caducous. *Flowers* small, greenish in peduncled panicles from upper leaf axils; peduncles 2-3 in. long. *Sepals* 5, minute. *Petals* 5, oblong, puberulous outside, much longer than the sepals, revolute. *Stamens* numerous; filaments filiform, exceeding the petals; anthers 2-celled, cells divergent at the base. *Ovary* pilose, 3-celled, with 2 ovules in each; style subulate. *Fruit* dry, turbinate, stellate pubescent, 3-winged at the top, 3-1 celled, wings oblong, elliptic or oblong, 1-1.7 in. long, unequal with subparallel veins, base of wings hollow and continuous with the cavity of the fruit.

KHASI & JAIINTIA HILLS in low elevations.

Fr. '12.

FAM. 26. ELÆOCARPACEÆ.

Trees or shrubs without mucilage sacs. *Leaves* alternate, simple, not lobed, stipulate. *Flowers* regular, 2-sexual, in axillary racemes. *Sepals* 4-6, valvate. *Petals* 4-6, valvate, generally lacinate at the apex, inserted outside the disk. *Stamens* indefinite, inserted on a fleshy disk; anthers linear, opening by terminal pores. *Ovary* sessile, 2-5 celled; style columnar. *Fruit* a drupe with a bony stone or a capsule. *Seeds* pendulous with fleshy albumen; cotyledons flat.

Peduncles racemed Torus raised. Fruit a smooth drupe.

... 1. Elæocarpus.

Peduncles 1-flowered. Torus depressed. Fruit an echinate or setose capsule.

... 2. Echlocarpus.

1. ELÆOCARPUS, Linn.

Trees. *Leaves* usually crenate or serrate and generally deep red when old. *Flowers* sometimes polygamous. *Sepals* 4-5, distinct, generally keeled within along the middle. *Petals* 4-5. *Disk* glandular. *Anthers* dehiscing by a transverse slit at the apex. *Ovules* 2 in each cell of ovary, pendulous. *Drupe* with a single horny tuberculate stone divided into 1-5 1-seeded cells. *Seeds* with hard testa.

- I. Petioles continuous, drupe globose.
Anthers bearded; ovary 5-celled, stone prominently tubercled.

.. 1. *E. Ganitrus*.

- II. Petioles geniculate and usually swollen at the apex; drupes elongate:—

A. Petals narrowed towards the base:—

1. Flowers under 4 in. —

a. Anthers bearded, but not awned at the apex:—

f. Petiole 1-2 in. long, thickened and with a pair of glands at the apex:—

Bracteoles minute, caducous; glands at the apex of petiole minute:—

* Leaves and petiole glabrous or glabrescent:—

Leaves and sepals prominently pustulate when dry, stone indistinctly rugose.

.. 2. *E. floribundus*.

Leaves and sepals not pustulate when dry, stone prominently rugose.

.. 3. *E. robustus*.

** Leaves and petiole tomentose.

.. 4. *E. Wallichii*.

*** Leaves glabrous; glands at the apex of petiole usually prominent, often of leafy processes; bracteoles fairly large, subsistent; stone tuberculate.

.. 5. *E. sikkimensis*.

1. Petiole under 1 in. long and without any glands at the apex:—

Nerve axils glandular, anthers shortly ciliate at apex, dry leaves often minutely pustulate, stone rugose.

.. 6. *E. lanceifolius*.

b. Anthers usually not bearded or awned at apex:—

i. Leaves glabrous, bracteoles minute, caducous:—

Leaves obovate, buds silky,

pyramidal, 5-cornered.

.. 7. *E. hygrophilus*.

Leaves narrow-lanceolate, buds glabrescent, ovoid oblong, sublerete.

.. 8. *E. acuminatus*

ii. Leaves ferruginous tomentose beneath, bracteoles lacinate or tinged, persistent:—

Petals lacinate to near the base.

.. 9. *E. Braccatus*.

2. Flower over .4 in. across; anthers awned:—

a. Large trees; lateral nerves of leaves usually 12 pairs or more, stone of fruit compressed, ridged, rugose:—

Leaves rather scattered, generally more or less acute at the base; petiole up to 2 in.; awn of anthers about as long as the anthers, stone ridged along the faces.

.. 10. *E. aristatus*.

Leaves usually closely crowded, generally obtuse at the base; petiole on young shoots very short and stout or 0, awn of anthers shorter than the anthers.

.. 11. *E. rugosus*.

b. Small tree; lateral nerves of leaves 7-8 pairs:—

Leaves oblanceolate, often with prominent glandular pits at nerve axils beneath.

.. 12. *E. obtusus*.

B. Petals dilated towards the base:—

1. Ovary villous, leaves more or less serrate:—

Lateral nerves of leaves over 12 pairs, usually glandular at the axils of bifurcations near the margin. Flowers (about .5 in.) long, anthers awned.

.. 13. *E. varunna*.

Lateral nerves of leaves under 12 pairs, not glandular at the axils of nerve bifurcations. Flowers small, about .15-.2 in. long; anthers shortly beaked.

.. 14. *E. prunitolius*.

2. Ovary glabrous, leaves entire, anthers awned, flowers about .3 in. long.

.. 15. *E. integer*,

N. B. Species 2-6 are closely allied. The characters on which their separation has been based are variable in this genus, further field observations are therefore necessary for their classification.

1. *Elæocarpus Ganitrus*, Roxb. Vern, *Rudraksha*, Sans. & Beng., Ass.; *Rudrai*, Ass.; *Ludurai-asing*, Miri & Abor; *Boragi-asing*, Miri; *Lekam-arong*, Mik.; *Ludrai*, Sylh. & Tipp., *Van-tha-mu-thing*, Kuki; *Undarmala-biphang*, Mech.; *Ludrok*, Udruk, Garo.; *Soh-langskai*, Khasi.

A tree up to 60 ft. in height and 4 ft. in girth, generally buttressed at the base; young parts silky puberulous. *Bark* fairly smooth and greyish-brown outside with light reticulate fissures and large white blotches; uniformly pale but turning brown after exposure and fibrous inside, .3-.5 in. thick. *Leaves* 3-6 by 1-2 in., oblong-lanceolate, oblanceolate or sometimes elliptic, acute or acuminate, minutely crenate serrate or subentire, thinly chartaceous, almost glabrous, turning yellow before falling; main lateral nerves 8-12 on either half, slender, arched; base generally narrowed or acute; petiole .4-.6 in. long, sharply margined. *Racemes* about 3 in. long, often drooping, mostly from axils of fallen leaves. *Flowers* white, nodding, .3-.5 in. across; buds ovoid, conical; pedicels .3-.4 in. long, silky. *Sepals* 2-2.5 in. long, linear-lanceolate, acuminate, silky canescent outside. *Petals* about .3 in. long, cuneate-oblong, pubescent along the margins near the base, lacinate one-third to half way down, into 10-15 processes. *Stamens* about 30; filaments very short; anthers .1-.15 in. long, one cell slightly longer than the other and bearing fine white bristles at the apex, torus pubescent, wrinkled. *Ovary* normally 5-celled, silky villous. *Drupe* .6-1 in. across, globose, deep blue and mealy outside, succulent when fully ripe; stone normally 5-celled, strongly tubercled and marked with as many longitudinal furrows as there are cells in the stone.

Unquestionably indigenous, occurs sporadically in all the DISTRICTS and ascending up to about 1000 ft., but nowhere so common as in the N. E. FRONTIER DISTRICT.

The wood is white, fine—and even-grained, tough and elastic. Weight 28 lbs. per c. ft.

The tree is much prized for its tubercled nuts which are strung up into rosaries worn by various sects of Hindus. Freaky nuts with fewer or more than 5 cells are believed to possess special merits attached to each number and therefore fetch much higher prices.

Flrs 5-6.

Fr. 11-12.

2. *Elæocarpus floribundus*, Bl. Vern. *Belphei*, Sylh., *Jalpai*, Beng.; *Ok-hi-simung-ti*, *Theng-koreng-arong*, Mik., *Charphal*, Manip.; *Badarphang*, Kach.; *Ron*, Kuki; *Koying*, Nep.

A tree up to 60 ft. in the height and 8 ft. in girth; branchlets glabrous, buds silky. *Bark* greyish-brown, vertically fissured, and often with horizontal wrinkles outside; reddish and fibrous inside. *Leaves* 3-6 by 1.5-2.5 in., ovate-elliptic, bluntly acuminate, acute or cuneate, less often rounded at the base, coarsely repand-serrate, subcoriaceous, glabrous, blistered on both surfaces when dry, turning bright red before falling; main lateral nerves 5-7 on either half, arcuate; tertiary nerves obscure; petiole .8-2 in. long, glabrous, thickened, geniculate and with a pair of small glands at the apex. *Racemes* 5-6 in. long, from axils of fallen leaves, 20-30 flowered; rachis minutely puberulous—glabrescent; pedicels .3-.6 in. long, glabrescent. *Flowers* white, .3 in. across. *Sepals* .2 in. long, lanceolate, blistered outside when dry scarcely keeled inside, thickened and tomentose at the margins. *Petals* as long as the sepals, triangular-cuneate, irregularly lacinate to varying depths into about 25-30 filiform processes, margins finely ciliate. *Stamens* 20-25; filaments very slender and weak, about .05 in. long, minutely puberulous; anthers slender, slightly longer than the filaments; cells nearly equal, terminated by a few minute bristles. *Disk*, *ovary* and base of style silky villous. *Drupe* light-green, about 1.8 by .8 in., externally resembling an olive, oblong, smooth; flesh pleasantly acid, edible; stone 3-celled or by suppression 2-celled, terete, tapering towards both ends, very shallowly rugose and with 3 fine furrows. *Seeds* .75 by .2 in., spindle-shaped; albumen oily.

In the Makum Range LAKHIMPUR and perhaps elsewhere throughout the upper parts of the ASSAM VALLEY, not common.

Often cultivated round homesteads in all the DISTRICTS, up to 5500 ft. in the KIIASI HILLS (Shillong) for the fruit.

The fruit is eaten cooked or pickled.

Fls. 5-8. Fr. 11-12

There seem to be two forms of this tree; 1. cultivated with narrower leaves, shorter pedicels and larger and more fleshy drupes and 2. wild with broader leaves, longer pedicels and smaller, harder and more astringent fruits.

3. *Elæocarpus robustus*, Roxb. Vern. *Poreng*, *Seleng*, Ass.; *Theng-phrang-ki-arong*, Mik., *Muya-phang*, *Bon-khong-krai-phang*, *Songrang-haphang*, Kach.; *Agong* or *Ragong*, *Bol-ragong*, *Gangmai*, Garo; *Tehei-chi-ching*, Naga; *Dieng-Lasaw*, Khasi (Tharia); *Dieng-ja-roi*, Khasi (Nongkla); *Dieng-soh-khyllam*, Khasi; *Huara*, Sylh.

A middle-sized tree up to 65 ft. in height and 6 ft. in girth; stem much fluted and with numerous aerial roots at the base in swampy localities; young shoots generally rusty pubescent. *Bark* light greenish-grey, nearly smooth and lenticelled on young trees, rough and warty on mature ones; fibrous inside, greenish yellow, on older stems mottled with deep brown dots. *Leaves* 4-9 by 2-4 in., ovate-oblong to ovate lanceolate, acuminate, rounded or cuneate at the base, cuspidately repand-serrate, thinly coriaceous, glabrous above, softly rusty tomentose, especially along the nerves

when young but afterwards glabrescent beneath, pinkish brown when very young; turning bright scarlet in the cold weather; main lateral nerves about 10-12 on either half, depressed above, prominent beneath, tertiary nerves laxly reticulate; petiole 1-2 in. long, swollen at both ends, geniculate and often with two processes near the apex. *Racemes* 2.5-5 in. long, generally from axils of fallen leaves; rachis grey, puberulous; bracteoles minute, caducous. *Flowers* white, fragrant, .25-.3 in. across; buds globose at first, gradually turning ovoid; pedicels .25-.5 in. long, grey puberulous, generally curved. *Sepals* .15 to .2 in. long, lanceolate, puberulous, rather strongly keeled inside, densely villous along the somewhat thickened margins. *Petals* irregularly laciniate into 30-40 very fine processes, basal portion densely ciliate along the margins. *Stamens* about 40; filaments very short; anthers about .06 in. long, minutely glandular puberulous, the longer valve ciliate. *Disk* of 5 distinct globose silky glands. *Drupe* about 1 in. long, ovoid, greenish-yellow, 2-3 celled, oblong or ovoid, with 3 shallow longitudinal grooves, rather prominently rugose, albumen oily.

Fairly common throughout the PROVINCE except perhaps in the N. E. FRONTIER DISTRICT, ascending up to about 2500 ft.

Wood greyish white, soft, even-grained but porous, med. rays fine. Weight about 35 lbs. per c. ft., takes a fine polish.

Fls. 4-5. Fr. 8-9.

Very closely allied if at all distinct is *E. lucidus*, Roxb. A tree up to 60 ft. in height and 4-5 ft. in girth. *Bark* plain, greyish white, with vertical lines of lenticels and faint horizontal wrinkles; red underneath the corky layer, dark brown inside, shading off to yellow near the cambium, turning blackish brown after exposure. *Leaves* 3-7 by 1.5-3 in., glabrous or more or less puberulous along the midrib above and the petiole; base often unequal; lateral nerves 8-11 on either side of midrib; petiole .6-1.8 in., generally with glandular spurs near the apex. *Flowers* somewhat smaller than *E. robustus*. *Stamens* 30 in 5 groups with reddish brown silky glands between the groups; filaments very short, longer anther cells with few or without apical bristles. Other characters as in *E. robustus*. *Drupe* not seen.

Dhansiri reserve, NOWGONG, Umling reserve KHASI & JAINTHIA HILLS, probably in all localities where *E. robustus* is found. There is no constant character by means of which the two can be separated.

4. *Elæocarpus Wallichii*, Kurz.

A small tree with brown smoothish bark; young shoots, under-surface of leaves along the nerves and petiole greyish or tawny tomentose. *Leaves* 6.5-12 by 3-5 in., oblong to elliptic, acuminate, distantly serrate or subentire, glabrate, except along the midrib and nerves above; lateral nerves 12-15 on either half, looping near the margin, prominent beneath; petiole 1-2 in. long, geniculate, often with two minute glands at the top. *Racemes* 4.5-8 in. long from the axils of fallen leaves, tomentose; pedicels .3-.4 in. long. *Flowers* small; sepals tomentose, lanceolate, about .2 in. long. *Petals* cuneate, deeply laciniate, .15-.2 in. long; anthers bearded. *Ovary* villous, 3-celled with 2 collateral ovules. Fr. not seen.

GOALPARA.

Stem sometimes stilted on aerial roots.

5. *Elæocarpus sikkimensis*, Mast. Vern. *Seleng*, Ass.

Generally the names given to the foregoing species are applied to this tree also.

A middle-sized tree up to 50 ft. in height; young shoots and inflorescence pubescent. *Bark* grey and rough with vertical fissures outside; green underneath the corky layers, pale, gradually more yellowish towards the cambium and sometimes mottled with reddish-brown dots inside. *Leaves* 4-7 in. by 2-3.5 in., elliptic or ovate-oblong, acuminate, somewhat distantly cuspidate-serrate, acute, subacute or obtuse at the base, rather thinly chartaceous, glabrous, orange red during the cold weather; lateral nerves 7-9 on either side of the midrib, much arched; tertiary nerves very slender, laxly parallel-reticulate underneath; petiole 1-2 in. long, thickened but not pronouncedly geniculate at the apex, generally with two leafy processes a little below the base of the blade which are sometimes up to .6 by .1 in., falcate and with a distinct midrib. *Racemes* 2.5-4 in. long, from axils of current year's leaves; thinly pilose; pedicels .3-.6 in. long, slender; buds silky, each supported by a large subpersistent boat-shaped hairy bractcole, .15-.25 in. long. *Flowers* about 12-20 in each raceme, .3-.4 in. across. *Sepals* narrow-lanceolate, sparsely pilose outside, thinly keeled and glabrous inside, tomentose at the thin margins. *Petals* white, cuneate, almost glabrous, divided above into 20-25 filiform processes. *Stamens* 25-30; tip of the longer anthers bearded with 2-4 very small white bristles. *Disk* small, silky, lobes obscure, contiguous. *Ovary* conical, silky; style persistent. *Drupe* 2 by 1 in.; stone tubercled.

Throughout Upper ASSAM in submontane tracts but more common in LAKHIMPUR than in the other DISTRICTS.

A more handsome tree than the preceding species.

Figs. 1-5:

6. *Elæocarpus lanceæfolius*, Roxb. Vern. *Dieng-soh-khyllum*, Kh.; *Dieng-soh-lyngka*, Synt.

A middle sized evergreen tree with spreading dense crown; young parts silky pubescent. *Bark* greyish brown and rugose with strings of lenticels outside, uniformly light red and fibrous inside. *Leaves* 2-6 by .75-2 in., lanceolate, elliptic-lanceolate or oblanceolate, acuminate, distantly crenate-serrate, glabrous or almost so, often minutely pustulate beneath, thinly coriaceous, turning bright red when old; lateral nerves 6-8 on either side of midrib often with glands at axils, arcuate, repeatedly bifurcate, and forming loops near the margin; base tapering or narrowed more or less to the margined petiole which is .3-.75 in. long and often rather obscurely geniculate at the apex. *Racemes* 2-3 in. long from the axils of leaves or of those of fallen leaves, puberulous; pedicels slender, .15-.2 in. long; bracts very small, linear lanceolate, caducous. *Flowers* white, small, buds lanceolate. *Sepals* .15-.2 in long, oblong-lanceolate, keeled, puberulous, often glabrate outside, depressed silky puberulous, often glabrate within, minutely woolly along the edge and the keel. *Petals* about as long as sepals, finely laciniate to about half the length, margins finely ciliate. *Stamens* up to 15, puberulous, anther cells

unequal, the larger or sometimes both, minutely bristly at the apex. *Disk* of 5 hairy, round, glands. *Ovary* villous, 3-celled. *Drupe* about 1-1.5 by .7-.9 in., ovoid, green with faint yellow specks, stone rugose with 3 longitudinal channels, 1-seeded.

KHASI HILLS, NAGA HILLS, GARO HILLS—Rongmachelgiri ascending up to 6000 ft.

The fruit is eaten. Wood brown with close annual rings and numerous extremely fine med. rays, pores few in short strings, soft, takes a good polish but is liable to crack in seasoning. Used for tea boxes, house building and charcoal.

Figs. 6-8. Fr. 11-12.

Var. *vestitus*—young parts and inflorescence brown tomentose. *Mature leaves* pubescent along midrib and nerves on the under surface, glabrate above except along the base of midrib; petiole upto .9 in., slightly or not margined, distinctly geniculate at apex, pubescent or puberulous. *Racemes* with stouter rachis than in the type; pedicels stout, 1 in. or less, buds ovoid lanceolate. *Sepals* 2 in. long, brown tomentose outside, thinly silky within, more broadly lanceolate than in the type.

—KASHI & JAINTIA HILLS, 4500-5000 ft.

Figs. 5.

7. *Elæocarpus hygrophilus*, Kurz.

A small tree upto about 50 ft. in height and 3 ft. in girth, young shoots terete, glabrous, shining. *Bark* greyish-brown and nearly smooth outside; light brown shading off to yellow near the cambium inside. *Leaves* 2.5-6 by 1.2-2.4 in., obovate, oblanceolate or cuneate-oblong, blunt-apiculate or rounded at the apex, cuneate at the base, crenately cuspidate-serrate, coriaceous, glabrous, shining above, pale or subglaucous beneath, turning yellow before falling; midrib stout; main lateral nerves about 7-9 on either side of the midrib, arched, slender, irregular, generally with large glandular pits in the axils; petiole .15-1 in. long, stout, flattened above, swollen at both ends, glabrous. *Racemes* 2-4 in. long, rachis rather slender, silvery-pubescent at first, afterwards glabrescent. *Flowers* small; pedicels 2-25 in. long, silvery-silky; buds pyramidal. *Sepals* .25 in. long, acute, silky-pubescent outside, velvety along the margins. *Petals* a little longer than the sepals, glabrous. *Filaments* short, minutely puberulous; anthers not bearded. *Ovary* silky, 3-celled. *Drupe* lanceolate, pointed at both ends.

Specimens collected only from Dirij, NORTH LAKHIMPUR, but this tree probably occurs throughout UPPER ASSAM round swamps and along edges of sluggish streams like *E. obtusus* which it very closely resembles in habit and foliage and for which it is liable to be mistaken when not in flower or fruit.

Figs. 4-5.

Elæocarpus sp. near *E. oblongus*, Gaertn. Vern. *Charai-guti-khowa*, Ass.; *Miri-Komker-asing*, Miri and Abor.

A small tree up to 40 ft. in height and 3 ft. in girth, generally growing near streams and throwing out numerous aerial roots. *Bark* dark-brown with many whitish lenticels outside; greenish brown inside. *Leaves* 3-5 by 1.5-2.5 in., obovate or oblong-elliptic, acuminate, cuspidately crenate-serrate, thinly subcoriaceous, quite glabrous, red during the greater part of the year; main lateral nerves 6-8 on either side of the midrib, slender, much arched, tertiaries very slender and finely reticulated; base narrowed; petiole .75-1.4 in. long, margined, more or less pubescent, often with two setose glands at the apex. *Racemes* about 3.5 in. long from the axils of existing or fallen leaves, pubescent; bracteoles .15 in., ovate lanceolate, adpressed silky pubescent; pedicels stout, about .3 in. long, disk glands about 10, villous. *Drupe* (rather immature) 1-1.5 in., oblong-ellipsoid, pointed at both ends, 2-1? celled.

Specimens incomplete not definitely determined.
Near Bomjui in N. E. FRONTIER DISTRICT also Makum Range in
LAKHIMPUR DIVISION.

Wood white, tough and stony.

Fr. 5-7.

8. *Elæocarpus acuminatus*, Wall.

A tree with lenticellate branches, bark greyish with shallow furrows. *Leaves* 2.5-5.2 by .6-1.2 in., narrow lanceolate, acuminate, coriaceous, glabrous, silky when very young; lateral nerves impressed and rather indistinct above, 8-10 on either half; base tapering to the short petiole; petiole up to .4 in. long, geniculate and slightly swollen at the top. *Racemes* stoutish from the axils of fallen leaves puberulous, 1.5-3.5 in. long, pedicels .2-.25 in.; buds oblong ovoid. *Sepals* .2 in. long, oblong lanceolate, nearly glabrous outside, adpressed pubescent, keeled within, minutely villous on the edges and the keel. *Petals* white, nearly as long as sepals or slightly shorter cuneate, apex laciniate to more than half the length into 16-18 segments, villous on the margins on the lower portion; stamens 35-40; filaments about half the anthers, both puberulous; anthers not bearded, shortly apiculate. *Disk glands* 5, broad, 2-lobed, pubescent. *Ovary* villous, 2-celled; ovules in 2 rows in each cell. *Drupe* not seen.

KHASI and JAINTIA HILLS, Mowmai, Chera. Thlongblei, up to 4500 ft.
Flrs. 9.

9. *Elæocarpus Braceanus*, Watt.

A small tree with warty brown bark; young shoots, undersurface of leaves along the nerves and petioles, ferruginous tomentose. *Leaves* 2.5-5.5 by .75-2 in., elliptic, elliptic-lanceolate or oblong lanceolate, acuminate, glabrous and impressed along the nerves above, strongly 9-10 nerved beneath; base narrowed; petiole .3-.6 in., slightly swollen and jointed at apex. *Racemes* from axils of fallen leaves 1.5-5.5 in. long, tomentose; pedicels stout, very short. *Buds* roundish or ovoid, supported usually by 3 long persisting, small, deeply lacinate bracteoles. *Flowers* small, brown tomentose. *Sepals* lanceolate, .15 in. *Petals* slightly smaller than the sepals deeply lacinate into numerous segments to near the base. *Stamens* 30 or more puberulous; anthers not bearded. *Ovary* 2-celled with 2-collateral ovules in each cell, villous; disk glands hairy. *Drupe* 1.25 by 1 in., abruptly pointed at the apex, stone ovoid, terete, very rugose with three rather indistinct grooves.

NAGA HILLS, KHASI and JAINTIA HILLS up to 5000 ft.

Flrs. 10. Fr. 6.

10. *Elæocarpus aristatus*, Roxb. Vern. *Gerela-sopa*, Ass. (Lakh.); *Nagint*, Ass. (Kam.); *Mirchobi*, Mik.; *Lechau*, Manip.; *Bou-champa*, Cach.; *Karnakhur*, Tipp.; *Chham-nangal*, *Gangma-jachhang*, Garo; *Dieng-thang-khapiah*, Khasi (Nongkila).

A large tree up to 100 ft. in height and 8 ft. in girth, stem of large trees buttressed at the base; branchlets thick, rough

with heart-shaped or oval scars of fallen leaves, coarsely rusty hairy towards the extremity. *Bark* dun-grey, nearly smooth, but with horizontal wrinkles and very fine vertical fissures outside; white with coarse brownish veins inside. *Leaves* somewhat crowded about the ends of the branchlets, erect and pinkish-green when young, 4-12 by 1.7-5.5 in., cuneate obovate or oblanceolate, rounded or subacute at the tip, usually cuneate at the base, distantly minutely serrulate or subentire, thinly but firmly coriaceous, glabrous, turning red before falling; midrib very stout; lateral nerves 12-22 on either half, slightly arched or almost straight, often glandular at the axils; petiole .6-2 in. long, swollen at both extremities, geniculate at the apex, flattened and rusty hairy above while young; stipules subulate, caducous. *Racemes* axillary, 4-6 in. long; rachis and pedicels rusty villous, but ultimately glabrescent; bracts leafy, cuspidate-toothed, often lacinate towards the base, up to .4 in. long, caducous; pedicels .5-.7 in. *Flowers* pale white, drooping, faintly scented, .8 in. diam.; buds lanceolate, 5-ribbed. *Sepals* .6-.7 by .1 in., narrow lanceolate, rusty-tomentose outside, glabrous within, margins rather thick, involute. *Petals* .5-.6 in. long, wedge-shaped, densely silky hairy outside, deeply lacinate. *Stamens* up to 55; filaments short; anthers about .2 in. long, linear, with an awn of about the same length. *Ovary* 2-celled, ovoid, very hairy; style subulate. *Drupes* about 1-1.3 in. long, oblong; stone sharply pointed at both ends, compressed, with a longitudinal ridge on each of the faces, rugose.

Fairly common throughout ASSAM except perhaps the N.E. FRONTIER DISTRICT, always in mixed high forests ascending to about 1600 ft.

Wood light dun-brown, moderately hard, weighing about 45 lbs. per c. ft. Medullary rays mostly very fine with occasional ones of moderate thickness; pores of moderate size, often subdivided, annual rings indistinct, used for tea-boxes.

Frs. 4-5. Fr. 8-9.

11. *Elaeocarpus rugosus*, Roxb. Vern. *Gatronga*, Ass. (Lakh); *Phul-champa*, *Bor-chopa*, Ass. (Darr.); *Turuk-pai-asing*, Miri and Abor; *Kadeng-srang-arong*, Mik.; *bon-lai-su-phung*, Kach.; *Sanku-nuru*, Daff.; *Ankhi-si-phak*, Garo.

A lofty deciduous tree up to 100 ft. or more in height and 14 ft. in girth, in foliage and habit closely resembling *Terminalia Catappa*; stem of mature trees buttressed at base; branches spreading; branchlets thick, more or less rufous-hairy. *Bark* greyish, rough and more or less wrinkled outside; green underneath the corky layer, pale-brown and mottled with brown dots or streaks inside. *Leaves* crowded at ends of branchlets, 6-16 by 3-6 in., obovate, oblanceolate or subpanduriform, subacute, bluntly apiculate or obtuse, narrowed and generally obtuse at base, distantly and often minutely cuspidate-serrate or subentire, coriaceous, glabrous when mature, turning red before falling; midrib stout, triangular in section; lateral nerves 12-16 on either half, spreading, usually with large glands at the axils; tertiaries strongly reticulate; petiole 0 or very short on young shoots,

1-2.2 in. on flowering shoots, twigs, thick, swollen at both ends. *Racemes* axillary or from nodes below the leaves, 4-7 in. long; rachis buff-tomentose; bracts up to 1.2 in. long, leafy, oblanceolate, serrate, caducous. *Flowers* of the size of the preceding species; pedicels .5-.9 in. long, buds cylindric, ovoid, pointed, 5-ribbed; .6-.75 in. long. *Sepals* linear lanceolate acuminate, buff-tomentose or pubescent outside. *Petals* about as long as the sepals, cuneate oblong, densely buff-silky outside, glabrous inside. *Stamens* up to 50; filaments shorter than the anthers, pubescent; anthers unequal, awns shorter than the anthers. *Ovary* 2 celled, shaggy, pointed; style much longer than the ovary, tapering to a fine point. *Drupe* about 1.3 in. long, obovoid, greenish yellow; stone generally 1-celled, compressed and with sharp edges, pointed, strongly rugose.

Fairly common throughout UPPER ASSAM, especially in the N. E. FRONTIER AND LAKHIMPUR DISTRICTS, ascending to lower foot hills.

Wood white of similar structure as of the last species but more porous and lighter, about 38 lbs. per c. ft. and annual rings marked by a thin line of softer tissue. Suitable for tea-boxes.

Fls. 3-4. Fr. 9-10.

12. *Elaeocarpus obtusus*, Bl. Syn. E. Monoceros, Cav. Vern. *puni-sopa*, Ass. (Lakh.); *phutkuli*, Ass. (Darr.)

A small tree up to 30 ft. in height and 2-2.5 ft. in girth, generally branched from near the ground and with aerial roots near the base; branchlets glabrous. *Bark* grey, nearly smooth, shining but with scattered lenticels, scarcely 1 in. thick, leathery; blaze pale. *Leaves* 3-5.5 by 1.5-2.5 in., obovate-oblanceolate, obtuse or subacute, cuneate at the base, distantly cuspidately crenate-serrate, thinly coriaceous, quite glabrous, shining above, dull beneath, turning yellow to deep orange before falling; lateral nerves 6-8 on either side of the midrib, slender, much arched, generally with large glandular pits at the axils; petiole .6-1 in. long, swollen at the ends, flattened above. *Racemes* 2-3 in. long, corymbose from the axils of existing or fallen leaves, 4-8 flowered; pedicels 1-1.5 in. long, slender, glabrate. *Flowers* .7-.9 in. long, dull white; buds lanceolate, 5-ribbed. *Sepals* .7 in. by about .12 in. near the base, oblong lanceolate, glabrous inside, with thickened tomentose margins. *Petals* cuneate, oblong, slightly larger than the sepals, canescent outside, thinly pilose inside. *Disk* 10 lobed, grey-silky as also is the ovoid ovary. *Stamens* 50-65, one of the anther valves terminating in an awn rather longer than the anther. *Drupe* 1.5 in. long, ovoid, obtuse; stone 1-celled, terete, strongly tubercled.

Along edges of swamps or sluggish streams in LAKHIMPUR, SIBSAGAR and DARRANG; not very common.

The stones of the fruit are slung up in roaries and given to children to wear.

Fls. 5.

E. *staffianus*, Gagnep. A middle-sized to small tree with light greyish bark. *Leaves* mostly towards the ends of branchlets, 4-6 by 1.5-2.5 in., oblong to obovate, apex somewhat obtusely acuminate, serrulate or nearly entire, thinly coriaceous, glabrous, axils of nerves glandular; petiole .3-1 in. long. *Racemes* axillary or

few from the nodes below the leaves, lax, shorter than the leaves, lax few (usually up to 4) flowered; pedicels 8-1.2 in. long, buds ovate acute, glabrescent, .5-.65 in. long. *Sepals* .6-.7 in. long, glabrescent or thinly pubescent outside. *Petals* about as long as the sepals, silky pilose, apex 2 lobed and laciniate into 25-30 segments. *Filaments* pubescent, shorter than the anthers, 1/2 as long as the anthers. *Drupe* ovate to oblong, stone 1 in. by .6 in., abruptly pointed at the apex and base, somewhat compressed, muricate, margins ridged, ridges denticulate.

Sadiya, Griffith 702 ! UPPER ASSAM.

Closely allied to the preceding if at all specifically distinct. Some of the sheets included under *E. obtusus* in Calcutta Herbarium are preferable to this species. These are apparently connected by good intermediates.

It differs mainly by fewer flowered, laxer racemes and more compressed ridged stone of the drupes.

13. *Elæocarpus Varunna*, Nam. Vern. Bhadrak or Bhadraksha, Poreng (?) Ass. (Sib.); Niganibual, Ass. (Lakh.); Pong-o-test, Naga; Gangma-chiring, Garo; Mir-chobe, Mik.; Dieng-ri-lam, Khasi; Dieng-sia-sah, Khasi (Uman); Dieng-soh-dkhap, Khasi (Nongkhlaw).

A fairly large tree up to 60 ft. in height and 6 ft. in girth with a large spreading crown; stem sometimes stilted on aerial roots; young parts grey silky pilose. *Bark* grey or brownish-grey, nearly smooth or lightly fissured, often with vertical lines of lenticels, blaze dirty or brownish yellow, fibrous and soft. *Leaves* 4-8 by 1.7-3 in., elliptic or oblong, finely acuminate, subacute or rounded at the base, regularly cuspidately crenate-serrate, firmly chartaceous or thinly coriaceous, grey silky when very young, afterwards bright green and shining, deep red before falling; lateral nerves 12-15 on either half, arched, repeatedly bifurcating near the margins, often with small glandular pits at the axils of the bifurcations; tertiary veins conspicuous though fine, rather close, subparallel; petiole 1.3-2.5 in. long, thickened and geniculate below insertions of blade. *Racemes* 2.5-5 in., axillary, ascending, at first grey-silky, glabrescent; pedicels .25-.5 in. long, rather stout and stiff, curved. *Flowers* .5-.6 in. across, white; buds lanceolate, about as long as the pedicels, obsolete 5-ribbed. *Sepals* densely bright silky, especially outside, lanceolate. *Petals* slightly shorter than the sepals, oblong, broadest at the base, pale silky except at the uniformly fringed apex. *Stamens* about 30; anthers shortly awned. *Disk* red, rather sharply 10 lobed. *Drupe* .7 by .5 in., oblong, rounded at the ends, shining, 1-celled, 2-seeded in all the fruits examined; stone subterete, pointed and with 3 minute apertures at the base, 3-furrowed, not prominently rugose, hirsute.

Common in mixed forests throughout Upper Assam, ascending to 3000 ft. in KHASI HILLS, GARO HILLS, NAGA HILLS.

Wood greyish-white, soft, weighing 30 lbs. per c. ft., fine and even grained, suitable for tea boxes.

Fls. 2-3. Fr. 7-9.

14. *Elæocarpus prunifolius*, Wall. Vern. Dieng-la-khmar, Dieng-ruin, Synt. Soh-khyllam-eit-blany, Soh-khyllam-ai-blany, Khasi.

A small evergreen tree. *Bark* grey and slightly rough outside, blaze pale brown, yellow near the cambium, green on the edges below the corky layer. *Branchlets* glabrous or nearly so; young leaves reddish brown. *Leaves* 2-5 by 1-2.2 in., oblong-lanceolate to elliptic lanceolate, acuminate, crenate-serrate or subentire, subcoriaceous, glabrous, shining above; lateral nerves 6-9 on either side, slender; petiole .8-1.5 in., swollen and geniculate at the apex. *Racemes* mostly axillary, 1.5-3.5 in. long, at first silky pubescent, ultimately puberulous, lower bracts leafy, upper small, broadly spatulate, caducous; pedicels slender, about .25-.33 in. long, often more or less bent near the apex, buds oblong lanceolate, adpressed silky. *Flowers* white; sepals .2-.25 in. long, pilose or glabrate outside, keeled and thinly adpressed pubescent within, margins villous; petals up to .2 in. oblong, laciniate into 6-8 short segments at the apex; base slightly broader, sacciform with two pits which cover the disk glands, adpressed silky on both sides. *Stamens* about 15-25, minutely puberulous; filaments short; anthers not bearded, larger lobe with a short blunt beak. *Disk* glands 10, roundish, silky. *Ovary* 2-3 celled, silky; ovules superposed. *Drupe* .6-.7 in. long, oblong-ovoid, stone .4-.15 in. long, ovoid, slightly rugose, obscurely 3 angled, 3 grooved, pointed at the apex with 3 apertures at the base.

SYLHET, KHASI AND JAINTIA HILLS ascending to 4500 ft.

The fruit is said to be edible. Wood yellowish brown, pores scanty, medullary rays numerous, very fine between slightly thicker ones, takes a good polish, but cracks on drying, not used.

Fls. 1-2. Fr. 10.

15. *Elæocarpus integer*, Wall. Syn. F. *petiolatus*, Wall. Vern. *Holthak*, Lushai, *Hun*, Tipp.; *Cheng-biehhal*, Sylh.

A medium sized tree. *Bark* greyish-brown, warty, more or less smooth, about .25 in. thick; blaze dun yellow, faintly mottled. shoots glabrate. *Leaves* usually 3-8 by 1.7-3.5 in., elliptic lanceolate or oblong elliptic, bluntly acuminate or acute, entire or distantly serrulate, glabrous, coriaceous; lateral nerves 7-8 on either half, nervules prominent, raised; base narrowed; petiole 1-3 in. long, geniculate at the top. *Racemes* axillary or from axils of fallen leaves, 3-5 in. long, glabrate; pedicels curved at apex, .25-.45 in., finely puberulous, buds ellipsoid, abruptly acuminate. *Flowers* .4-.5 in. across; sepals .25-.3 in. long, lanceolate, glabrate outside, puberulous and keeled within, margins finely villous. *Petals* nearly as long, oblong, finely laciniate and glabrous at the apex, silky on both surfaces, the hairs on the inner face reflexed, ridged in the centre, concave; base saccate with a sub two-celled pit and broader. *Stamens* 30; filaments less than half the length of anthers, finely adpressed pubescent, longer lobe of anthers awned, awns reflexed, disk of 2-10 rounded glabrescent glands. *Ovary* glabrous, 2-celled with 2 superposed rows of ovules. *Drupe* oblong ovoid, .6 in. long; stone slightly rugose, indistinctly 4-ridged.

CACHAR, SYLHET,

Fls. 1.

E. bracteatus, Kurz.—A large tree. Leaves perfectly glabrous, elliptic, obovate, serrate, narrowed into a petiole .5-1 in. long, which is thickened and geniculate at apex. Secondary nerves 8-10 pair. Racemes short, corymbose. Pedicels 3 times the length of sepals, in the axils of oblong-obovate, often serrate bracts. Sepals .7 in. long. Awn nearly as long as anther, ovary 2-celled, tomentose, stone wrinkled.

UPPER ASSAM (After Brandis).

2. ECHINOCARPUS, Bl.

(Included under *Sloanea* Linn. in Engler & Prantl iii 6.5)

Trees. Leaves penniveined; petiole swollen and geniculate at the apex. Peduncles axillary, 1-flowered, solitary or fascicled. Sepals 4-5, imbricate. Petals 4-5, variously cut. Stamens numerous, free, on a thick flat disk; anthers linear. Ovary 3-4 celled, cells many ovuled; style subulate. Fruit a 3-4 celled or by abortion 1-celled loculicidal—capsule covered with prickles or bristles.

Capsules covered with wiry persistent spines, .6-1 in. long:—

Leaves large, membranous.

.. 1. *E. assamicus*.

Capsules covered with deciduous bristles under .2 in. long:—

Leaves glabrous beneath, capsule about 1 in. across.

... 2. *E. dasycarpus*.

Leaves tomentose beneath, capsule 1.5 in. or more across.

... 3. *E. tomentosus*.

1. *Echinocarpus assamicus*, Benth. Vern. *Joba-hingori*, Ass.; *Phul-hingori*, Ass. (Sib.); *Bandor-lukoi* (monkey's comb), Ass. (lakh); *Sibe-taba*, Abor & Miri; *Tane-using*, Abor; *Sibe-dumpuk*, *Sibe-tatur*, Miri; *Tophen-changne*, Duff.; *Phong-rong-arong*, Mik.; *Sarang*, Meeh.; *Sita*, *Sinta*, Sylh. & Cach.; *Phaithing*, Kuki; *Thing-pat-lhui*, Tipp.

A deciduous tree up to 60 ft. in height and over 5 ft. in girth; old trees usually buttressed at the base. Bark fairly smooth, generally with horizontal wrinkles, grey or blackish outside, often with white blotches, thin; blaze rather granular, very light dun-brown. Leaves 4-16 by 2-6 in., elliptic or oblanceolate, abruptly acuminate, tapering down to a narrow but rounded often cordate base, obsoletely cuspidate-serrate, membranous, thinly pubescent and somewhat harsh beneath, ultimately glabrescent; lateral nerves 7-10 on either half, arched; petiole .4-2.8 in. long, thickened and geniculate at the apex. Flowers after leaf fall, pale creamy white, about .6 in. across; peduncles (in flower) 1-1.5 in. long, buff-tomentose, sub-fascicled or scattered between the leaves, shortly elongating and thickening in fruit. Sepals 1, about .4 by .2 in., densely buff-tomentose, especially outside. Petals 4, cuneately suborbicular, about as long as the sepals, densely pubescent. Stamens 60-150 on a flattened pitted torus; filaments about .2 in. long, densely pubescent; anthers about as long or slightly shorter, linear, sparsely puberulous, opening by an oblique terminal pore. Ovary 4-celled, ovoid, densely silky; style .3 in. long, conical, hairy. Capsule 4-celled, 2-3 in. across with the spines which are very dense, sharp-pointed and sparsely hispid. Seeds arillate.

A common tree in all the DISTRICTS and more or less gregarious on low banks of streams and reclaimed marshes.

Wood of a light cream-colour, light and soft, used for tea-boxes and planking.

Flrs. 10-11. Fr. 3-4. Leafless 9-10.

2. *Echinocarpus dasycarpus*, Benth.

A large tree up to 80 ft. in height and 7 ft. in girth, apparently evergreen. *Bark* greyish-brown, nearly smooth, with faint horizontal wrinkles; inside hard, light reddish-brown with streaks of pale tissue. *Leaves* 4-7 by 2-2.5 in., elliptic, oblong or oblanceolate, acuminate, more or less rounded or narrowed at the base, entire or distantly serrulate, coriaceous, glabrous; main lateral nerves 5-6 on either half, much arched, prominent beneath; petiole .8-1.1 in. long, much swollen at both ends. *Peduncles* usually axillary, solitary or sometimes two together, .5-1.5 in., elongating in fruit, puberulous. *Flowers* .5-.7 in. across, yellowish-white. *Sepals* slightly unequal ovate-lanceolate to broadly elliptic, buff-tomentose. *Petals* broadly obovate, variously cut at the apex and a little longer than the sepals, pubescent. *Stamens* 50-55, pubescent, awned anthers with the awn about as a long as, or slightly longer than filaments. *Ovary* ovoid, villous. *Capsule* about 1 in. diam., globose, generally with 4 woody valves, covered with very dense weak deciduous bristles about .1-.15 in. long, somewhat flattened and obsoletely feathered with golden hairs. *Seeds* black, with a red arillus.

Jaypur Reserve, LAKHIMPUR, NAGA HILLS, KHASI HILLS, 3500-5000 ft.

Wood greyish-brown, soft; pores regular; medullary rays fine and moderately broad, closely packed, straight. Used for planking and tea-boxes in Darjeeling.

Flrs. 7-8. Fr. 1-2.

3. *Echinocarpus tomentosus*, Benth.

A moderate-sized tree. *Bark* dark brown corky outside; dull-white brown, mottled and coarsely fibred inside; young shoots brown tomentose. *Leaves* 6.5-9.5 by 3-5.5 in. (but sometimes attaining 12 by 8 in.), elliptic or ovate, acuminate, coarsely toothed, coriaceous, glabrous above, tomentose beneath along the nerves; lateral nerves 11 on either half, arcuate, prominent; base often narrowed, subcordate or rounded; petiole 1-2 in. long, pubescent, ultimately glabrate, swollen at the apex. *Flowers* .5 in. across, sepals 5, ovate, pointed. *Petals* oblong, concave, 1-5 toothed at the apex. Anthers apiculate. *Capsules* about 1.5 in. across, globose or ovoid, woody, 1-5 valved, rose-pink inside covered with bristles .1 in. long, somewhat dilated towards the top, plumose with hairs, seeds arillate.

KHASI HILLS up to about 4000 ft.

Wood white, soft with large often partitioned pores.

Flrs. 9? Fr. 10-12?

E. Sigun. Blume. A tree. *Leaves* 3-5 by 1-2 in., ovate, oblong or lanceolate, shortly acuminate, chartaceous, glabrous but with a tuft of hairs at the nerve axils; lateral nerves 5-6 on either side,

the first pairs subbasal, very oblique, base rounded, petiole 1-1.5 in. long. *Flowers* solitary, crowded at the base of ^acurrent year's shoots; peduncle .1 in. long, dilated upwards. *Disk* thick, rusty tomentose. *Style* combined, .2 in. long. *Ovary* ovoid or conical, densely tomentose (also with small bristles). Capsule subglobose about 1.4 in. long, generally 4 valved; prickles .2-.4 in. long, blunt, thicker at the base, irregularly set, about .1 in. apart.

* Said to occur in KHASI HILLS, but the only specimens I have seen in Calcutta Herbarium are from Java.

Fr. 10-11.

FLORA OF ASSAM

BY

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VOL. I. (PART II).

LINACEÆ TO MORINGACEÆ



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PREFACE

Part II of Vol. I includes the botanical and vernacular names of species described in both Part I and II. The vernacular names alone cannot be used for the identification of the species, as these vary from district to district and even within the limits of one district. In many cases several species are known locally by the same vernacular name. It is therefore necessary to issue a warning and to point out the necessity for checking the plants in detail with the description given in the Flora.

Since sending the materials of the Parts I and II of Vol. I to the press, the following species have been collected from the province, but it was too late to incorporate the descriptions in their proper places. It is however proposed to publish their descriptions as an 'addendum' later on.

PART I.

<i>Species.</i>	<i>Natural Order.</i>
1. <i>Ranunculus lætus</i> Wall.	Ranunculaceæ.
2. <i>Dillenia parviflora</i> Griff.	Dilleniaceæ.
3. <i>Magnolia obovata</i> Hast.	Magnoliaceæ.
4. <i>Polyalthia obliqua</i> Hk. f. & T.	Anonaceæ.
5. <i>Cocculus villosa</i> DC.	Menispermaceæ.
6. <i>Gynandropsis speciosa</i> Halter.	Capparidaceæ.
7. <i>Homalium ciliatum</i> Debb.	Flacourtiaceæ.
8. <i>Polygala persicariæfolia</i> DC.	Polygalaceæ.
9. " <i>erioptera</i> DC.	"
10. <i>Salomonina cantoniensis</i> Lour.	"
11. <i>Garcinia ovalifolia</i> Hk. f.	Guttiferæ.
12. " <i>Mangostana</i> Linn.	"
13. <i>Gordonia dipterosperma</i> Kurz.	Ternstroëmiaceæ.
14. <i>Sida acuta</i> Burm.	Malvaceæ.
15. <i>Abutilon striatum</i> Dick.	"
16. <i>Hibiscus subdrifa</i> Linn.	"
17. <i>Pterospermum cinnamomum</i> Kurz.	Sterculiaceæ.
18. <i>Echinocarpus murex</i> Benth.	Tiliaceæ.

PART II.

<i>Species.</i>	<i>Natural Order.</i>
1. <i>Hiptage bengalensis</i> Kurz.	Malpighiaceæ.
2. <i>Bœninghausenia albiflora</i> Rehb.	Rutaceæ.
3. <i>Canarium sikkimensis</i> . King.	Burseraceæ.
4. <i>Walsura piscidia</i> Roxb.	Meliaceæ.
5. <i>Amoora spectabilis</i> Miq.	"
6. <i>Dysoxylum khasianum</i> Brace.	"
7. <i>Platea latifolia</i> Blume.	Olacaceæ.
8. <i>Euonymus glaber</i> Roxb.	Celastraceæ.
9. " <i>echinatus</i> Wall.	"
10. " <i>Griffithii</i> Kurz.	"
11. " <i>pendulus</i> Wall.	"
12. <i>Kokoona littoralis</i> Laws.	"
13. <i>Celastrus Championii</i> Benth.	"
14. " <i>Hookerii</i> Prain.	"
15. <i>Salacia membranacea</i> Laws.	"
16. <i>Vitis himalayana</i> Brand	Vitaceæ.
17. " <i>tuberculata</i> Laws.	"
18. " <i>bifurcata</i> Wall.	"
19. <i>Leea sundaica</i> Miq.	"
20. <i>Cupania khasiana</i> R.	Sapindaceæ.

Shillong,

C. PURKAYASTHA

10th October, 1936.

FLORA OF ASSAM

DISCIFLORÆ.

FAM. 27. LINACEÆ.

Herbs, shrubs or infrequently trees. *Leaves* alternate, simple; stipules lateral, intrapetiolar or 0. *Flowers* regular, bisexual, often 2 or more-morphic. *Sepals* 5 (or 4), free or connate at the base, imbricate. *Petals* 5 or (4), hypogynous or slightly perigynous, imbricate, often contorted, usually fugacious. *Stamens* 1-2 (or sometimes 3) times as many as the petals, occasionally with staminodes united at the base into a ring or short tube; filaments inserted on or near the apex of the tube; anthers versatile. *Disk* of 5 glands-sometimes two-lobed, united to the staminal tube or 0. *Ovary* free, 3-5 celled; ovules 1-2 in each cell, pendulous; styles 3-5, free or connate; stigmas usually terminal. *Fruit* a septicidal capsule, often splitting into cocci or a drupe.

Fruit capsular :—

Calyx glabrous :—

Undershrub; Stamens 5; staminodes 5. .. 1. Reinwardtia.

Small tree; stamens 10. .. 2. Ixonanthes.

Calyx with gland tipped bristles. .. Anisadenia.

Fruit a drupe; stamens 10. .. 3. Erythroxylon.

1. REINWARDTIA Dumort.

Reinwardtia trigyna Planch (incl. *R. tetragyna* Planch). Vern. *Puinli-phul*, Beng., Nep.; *Tin-wa-lei*, *Syntew-lang-ksir*, Kh.

A glabrous undershrub about 3-4 ft. high often with rooting branches. *Leaves* 1-5 by 4-1.5 in., oblanceolate or narrow oblong-lanceolate, usually mucronate, entire or with few minute teeth; lateral nerves fine, variable, usually 5-9 on either half, uppermost pair converging to the apex, membranous; base narrowed and decurrent into slender or ordinary short petiole; stipules minute, caducous. *Flowers* 1-2 in. across, bright golden yellow, solitary, often on short branchlets or in axillary or terminal cymes; pedicels up to 1 in. long. *Sepals* 5, persistent, lanceolate, 4-5 in. long. *Petals* 5, 1-1.5 in. long, obovate, somewhat abruptly narrowed towards the base; stamens 5, included, alternating with as many staminodes, longer than the styles in some flowers and shorter than them in others. *Disk* glands 2-3.

Styles 3, sometimes 4-5 (*R. tetragyna*), more or less connate at the base. *Capsule* globose with thin papery walls, .25 in. across.

Foot of NAGA HILLS in LAKHIMPUR & SIBSAGAR and probably in similar localities elsewhere; KHASI & JAINTIA HILLS ascending to about 6000 ft., sometimes cultivated in gardens. Sometimes gregarious and very showy with its golden yellow flowers.

Flrs. Autumn and winter.

2. IXONANTHES Jack.

Ixonanthes khasiana Hk. f. Vern. *Theibar*, Tipp.; *Selbal*, Garo; *ching-buphai*, Kuki.

A moderate to fairly large glabrous tree attaining 120 ft. in height and over 30 in. in diameter in favourable localities, fluted at the base. *Bark* thin, greyish, rough outside; dark red inside with very fine lines of lighter tissue. *Leaves* 3-6 by 1.2-2.4 in., elliptic-lanceolate to oblong, obtusely acuminate, entire, membranous; secondary nerves about 6-9 on either half with many intermediate nerves of equal thickness, lower oblique, upper arcuate; base narrowed and decurrent into a short petiole. *Flowers* about .2 in. across, in. long peduncled, axillary, cyme bearing panicles; peduncles 1.5-3.5 in. long, more or less flattened and obscurely winged; bracts and bracteoles minute, acute; pedicels .08-.15 in. long. *Sepals* usually 5, shortly connate at the base; persistent, oblong-ovate. *Petals* 5, perigynous, suborbicular-contorted, persistent, enlarged and hardened round the fruit. *Stamens* 10, inserted outside the perigynous annular disk. *Ovary* free, 5-celled; style simple. *Capsule* 5 valved, oblong, pointed at the apex, about 1.5 in. long. *Seeds* winged at the top, about 1 in. long including the wing; wing .15-.2 in. broad, obliquely oblong.

SYLHET, GARO HILLS, and CACHAR.

Wood light brown, even grained, traversed by numerous wavy concentric but discontinuous bands of soft tissue, medullary rays very fine. Takes a fine polish and ornamental in appearance, should prove suitable for cabinet work.

Leaves dry reddish brown.

Flrs. 4. Fr. 12?

ANISADENIA Wall.

Perennial herbs or undershrubs. *Leaves* alternate or somewhat whorled at the top of the stem; stipules intrapetiolar, striate. *Flowers* in terminal spicate racemes; bracts minute, concave, caducous; pedicels short, ultimately reflexed. *Sepals* 5, lanceolate with gland tipped bristles outside. *Petals* 5, contorted, fugacious. *Stamens* 5, hypogynous, connate below, alternating with interposed staminodes. *Glands* 3, one very large. *Ovary* 3 celled; styles 3. *Capsule* oblong, membranous, 1 seeded.

A. saxatilis Wall.—An undershrub or perennial herb, with weak ascending stems upto 18 in. high; lower part often creeping and rooting. *Leaves* 2-4 by .8-1.2 in., lanceolate to oblanceolate or elliptic lanceolate, shortly acuminate, or acute, entire or nearly so, glabrous above, sparingly pubescent and pale beneath; petiole upto .7 in. *Racemes* 2-5 in. long. *Flowers* .3-.25 in. across, pink; pedicels minute.

KHASI HILLS, 4-6000 ft.

Flrs. 7-8. Fr. 10-11.

A. pubescens Griff.—A perennial herb often gregarious in patches, more slender in habit than the preceding. *Leaves* 1-1.5 by '5-'8 in. long, elliptic to lanceolate, acute or shortly acuminate; base acute to cuneate, undersurface pubescent or villous with adpressed silky hairs. *Flowers* about '5 in. long, white, much larger than in *A. sextilis*.

KHASI HILLS, 5-6000 ft.

Flrs. 7-8. Fr. 10-11.

3. ERYTHROXYLON Linn.

Erythroxyton Kunthianum Wall, Vern. *Dieng-pyllengtham*, *Dieng-pain-khar*, Kh.; *Dieng-juwat*, *Dieng-sugsi*, Synt.

A shrub or a small tree; branchlets lenticellate, younger shoots reddish. *Bark* greyish; rough, thin, inside reddish with white streaks which turn brown on exposure. *Leaves* 1.3-3 by '6-1 in., oblong to elliptic lanceolate or obovate-lanceolate, subacute or bluntly acuminate, rarely rounded at the apex, entire, chartaceous, glabrous above, glaucous beneath, red when young; midrib prominent; lateral nerves fine and rather indistinct, similar to intermediate nerves, looping at a short distance from the margin; base narrowed; petiole '1-'1.5 in. long, usually red; stipules intrapetiolar, subulate, setulose on the margin. *Flowers* white, '1.5 in. across, solitary, axillary, often 1-sexual; pedicels slender, thickened upwards, about .3 in. long. *Sepals* 5, ovate acuminate, free nearly to the base. *Petals* 5, up to '1.5 in. long, elliptic-oblong with a 2-fid white ligulate appendage near the base. *Stamens* 10, unequal, usually alternately short; filaments dilated towards the base and united into a tube half way down, free end puberulous. *Ovary* 3-celled; styles 3. *Fruit* a ventrally curved, 3-gonous, more or less erect, glabrous, shining, drupe '5 by '2.5 in., seated on the persistent calyx, red when ripe.

KHASI and JAINTIA HILLS 3000-5500 ft.

The bark is said to be used for chewing with *pan*. Wood light brown, hard, takes a beautiful polish, pores mostly in radial strings joined by numerous very fine transverse lines.

Flrs. 4. Fr. 9.

FAM. 28. MALPIGHIACEÆ.

(Indian genera).

Usually scandent shrubs. *Leaves* opposite, simple, entire, usually exstipulate. *Flowers* regular or irregular, bisexual, 5-merous, white or yellow in axillary or terminal panicles; pedicels articulate, bracteate. *Calyx* deeply 5-partite, in some genera with a gland outside. *Petals* 5, free. *Disk* obscure. *Stamens* 10, hypogynous,

equal or unequal; filaments free or connate below. *Ovary* free, 3-celled, 3-lobed; cells 1-ovuled; styles 1-3. *Fruit* of 1-3 samaras. *Seeds* exalbuminous.

Flowers irregular; calyx glandular; style 1; carpels winged only at the apex.

.. 1. *Hiptage*.

Flowers regular; calyx glandular; styles 3; carpels surrounded by a continuous wing.

.. 2. *Aspidopterys*.

1. HIPTAGE Gærtn.

Climbing shrubs or rarely small trees. *Leaves* opposite, coriaceous, entire, sometimes with intramarginal glands, exstipulate. *Flowers* in simple racemes or leafy panicles, irregular. *Calyx* 5-partite with one large gland outside, partly on the pedicel. *Petals* 5, one differently coloured, unequal, clawed, silky. *Stamens* 10, declinate, one much larger than the others; filaments connate at the base. *Ovary* 3-lobed; styles 1-2, at first coiled; stigma capitate. *Fruit* of 1-3, 3-winged samaras. *Seeds* globose, cotyledons unequal.

Leaves usually acute; shortly acuminate.

Terminal racemes paniced and usually exceeding the leaves.

.. 1. *H. Madablota*.

Leaves usually caudate acuminate.

Racemes much smaller than the leaves

.. 2. *H. acuminata*.

1. *Hiptage Madablota* Gærtn. Vern. *Madhabilata*, Sans., Beng. and Manip.; *Basanti*, Beng.; *Kerek-lata*, Ass.; *Dim-tri-rang-rikang*, Mik.; *Dugrak*, *Dugrak-budu*, Garo.; *Meisheim*, Khasi.

A large evergreen scandent shrub; young shoots more or less pubescent; branches dark brown or black, covered with numerous round lenticels. *Leaves* 4-6 by 1.5-2.5 in., oblong or ovate-lanceolate, acuminate, coriaceous, glabrous, dark-green, shining above, reddish-brown when very young, turning yellow before falling; main lateral nerves 4-6 on either half, arcuate; base acute, rarely rounded; petiole .2-.5 in. long, channelled above. *Flowers* .6-.8 in. diam., more or less scented, in large terminal and smaller axillary leafy panicles or racemes; pedicels .5-.7 in. long, bracteate at the base and with 2 setaceous bracteoles about the middle where they are joined. *Calyx* with a large oblong gland outside; segments .25 in. long, imbricate, silky pubescent. *Petals* .4-.6 in. long, unequal, obovate, clawed, fimbriate, 4 white, the 5th wholly or partly pale-yellow. *Stamens* 10, declinate, one much larger than the rest; filaments shortly connate at the base. *Style* 5, filiform. *Carpels* pubescent; wings 3, oblong-obovate or oblanceolate, sometimes deeply notched at the broad apex, the largest up to 2 by .4 in. *Seeds* globose.

Throughout ASSAM ascending to 2500 ft. in K. & J. HILLS.

Flrs. 1-3. sometimes 11? Fr. 4.

2. *Hiptage acuminata* Wall. Vern. *Jeremai-soh-pad-purao*, Kh.

A spreading bush or a strong climber (?), branchlets pubescent when young, very rugose. *Leaves* 3-7·5 by 1·2-2·5 in., lanceolate, usually caudate-acuminate; lateral nerves 4-7 on either half, oblique to arcuate, tertiaries subparallel, strong, sometimes with remote, deeply impressed glands or points or finely reticulate intramarginal nervules; base narrowed obtuse or rounded; petiole 2·3 in. long, stout, pubescent when young. *Racemes* rusty tomentose, axillary, about 1-2 in. long; pedicels 7-1 in. long, bracteate, with a pair of subulate bracteoles half way up. *Flowers* about 7 in. across; stamens much shorter than the style; samaras generally 3-winged, wings unequal 1-2·5 by 3·6 in., rather membranous, faintly longitudinally nerved.

MANIPUR, Watt! NAGA HILLS, KHASI HILLS up to 4500 ft.-Lyngkerdem, Cherra-Collet! ASSAM-Jenkins.

Flrs. 3-5. Fr. 5-7.

The habit is generally said to be that of a spreading bush but one of my specimens sheet 6198 is from a strong climber.

2. ASPIDOPTERYS A. Juss.

Climbing shrubs. *Leaves* entire; stipules small or 0. *Flowers* small, inodorous, in panicles or fascicles; peduncles bracteate; pedicels slender, articulate, often 2 bracteolate. *Sepals* 5, short, eglandular. *Petals* 5, entire. *Stamens* 10; filaments free or connate at the base; anthers ovate. *Ovary* 3-locular; styles 3. *Fruit* of 1-3 samaras, with a shield-like membranous wing round the nucleus. *Seeds* oblong, cotyledons straight, equal.

I. *Leaves* nearly glabrous or glabrous, samara hairless:—

Samaras narrowly ovate or oblong, more or less narrowed at the apex, nucleus not crested between the wings.

.. 1. *A. glabriuscula*.

Samaras orbicular, often broader than long, nucleus crested in the concavity of the wings.

.. 2. *A. elliptica*.

II. *Leaves* silky pubescent or tomentose beneath; wings of samara more or less hairy, elliptic ovate.

.. 3. *A. nutans*.

1. *Aspidopterys glabriuscula* (Wall) A. Juss. Incl. *A. Roxburghiana* F. B. l. Vern. *Mei-thit*, Khasi.

A woody climber; young parts pubescent but soon glabrescent; stem grey-brown. *Leaves* 2-4 by 1·2-2 in., elliptic or elliptic-lanceolate to ovate, shortly and somewhat abruptly acuminate, rounded or cordate at the base, quite entire, membranous or thinly chartaceous, glabrous above, sparsely pubescent along the midrib and nerves beneath; lateral nerves 4-7 on either half, arcuate, the lowest pair subbasal; petiole 3-7 in. long, channelled. *Flowers* in terminal and axillary, lax, rusty pubescent panicles, panicle branches usually verticillate; pedicels subumbellately crowded or racemed on the ultimate branches of the panicles

filiform, jointed below the middle, pubescent throughout or glabrescent. *Calyx-lobes* 5, up to .1 in. long, obovate oblong to elliptic, pubescent or glabrescent. *Petals* 5, .15-.25 in. long, obovate-oblong, oblong-elliptic or ovate, rounded at the apex, ultimately reflexed. *Stamens* 10, all fertile; filaments filiform, jointed a little below the middle. *Ovary* 3-celled, pilose or glabrescent. *Samaras* 1-3, nucleus not crested, wing 1.15 by .4-.6 in., continuous, peltate, ovate-oblong to ovate-lanceolate or oblong, narrowed upwards and rounded or sometimes truncate at the apex, membranous, finely veined, translucent, glabrous.

SIBSAGAR, LAKHIMPUR, DARRANG, GOALPARA, N. CACHAR HILLS. SYLHET, KHASI & JAINTHIA HILLS up to 1000 ft., chiefly in scrub forests and old village sites, probably all over the province.

Flrs. 5-7. Fr. 11-1.

Niendenzu in Das Pflanzenreich distinguishes the following varieties:—

Var. 1. *subrotunda*; *A. Henryi* Hutchinson. Leaves broadly ovate to orbicular ovate, shortly but sharply acuminate, sometimes tomentose beneath; style glabrous. *Samara* elongate oblong.

ASSAM—Masters! Jenkins!

Var. 2. *brevicuspis*; *A. floribunda* Hutchinson. Leaves mostly obovate to oval, very shortly acuminate. *Ovary* glabrous or more or less puberulous; *samara* oblong to oblong lanceolate.

Tharia—KHASI HILLS, Simmons! Clarke! CACHAR, Keenan!

Var. 3. *longicuspis*.—Leaves ovate-lanceolate to lanceolate, rather long acuminate. *Ovary* glabrous to more or less puberulous.

KHASI HILLS, up to 5000 ft.

2. *Aspidopterys elliptica* A. Juss? Vern. *Ka-chali*, Kh.

A large woody climber with greysih lenticellate branches; young parts and inflorescence thinly adpressed pubescent but soon becoming glabrous. *Leaves* 4-6 in. by 2-3.5 in., broadly elliptic or ovate-lanceolate, shortly and often somewhat abruptly blunt acuminate, chartaceous; lateral nerves 5-6 on either side, arcuate; petiole .4-.8 in. long. *Flowers* white, panicles lax, terminal and axillary, usually with corymbose or subumbellate branches; pedicels filiform, up to .8 in. long, umbelled or subumbellately corymbose on slender peduncles, jointed below the middle. *Sepals* up to about .1 in. long, ovate to oblong, margins ciliolate, thin. *Petals* .2-.25 in. long, ovate oblong, rounded at the apex; *ovary* glabrous. *Samaras* 1.5-2.5 in. across, orbicular, sometimes broader than long, often emarginate at the apex with a crest .9-1.2 in. long and up to about .3 in. broad on the nucleus, nerves prominent ending in submarginal loops.

KHASI HILLS—Nongpoh about 2000 ft., N. CACHAR HILLS—Borail Reserve, about 700 ft.

The bark is said to be chewed with *pan* in the Khasi Hills.

Flrs. 5-6. Fr. 12.

The description applies to Assam Herbarium Sheets Nos. 9783, 4005 and 5695. These agree with the sheets identified as *A. elliptica* at Kew with the exception of the fruit which is larger in our specimens.

3. *Aspidopterys nutans* Hk. f., non *A. nutans* (Wall) A. Juss; *A. lanuginosa* Wall (A. Juss). Vern. *Dusisimmak*, Garo; *Jarmaitodong-khnai*, Khasi.

A woody climber; young shoots and inflorescence adpressed grey or brownish silky tomentose. *Leaves* 4-10 in. long, broad

ovate or suborbicular, shortly acuminate; lateral nerves about 6 pairs, arcuate, adpressed-pubescent on the nerves beneath, rather thinly in the intermediate spaces and on the upper surface; petiole .75 to 2 in. long, puberulous. *Panicles* lax; pedicels .5-.7 in. long, jointed about or below the middle, glabrous above the articulation. *Sepals* obtuse, .05 in., glabrous or glabrescent. *Petals* oblong to elliptic. *Ovary* villous. *Wings* of samara elliptic ovate, reticulate, somewhat narrowed and often with a shallow notch towards the apex, adpressed pubescent on both sides round the nucleus, sparsely elsewhere, reticulate, membranous, translucent, 1.2-1.5 by .7-1.2 in.

DARRANG, GOALPARA, GARO HILLS, KAMRUP. KHASI & JAINTIA HILLS ascending to 2000 ft.

Flrs. rainy season. Fr. 10.

A. lanuginosa (Wall) A. Juss should probably take priority over Hooker's name, but I have retained it on account of its being better known to Foresters.

Aspidopterys oxyphylla A. Juss.—A rather imperfectly known woody climber. *Leaves* 3-4 in. long, ovate or elliptic ovate, acuminate, pubescent beneath. *Panicles* tomentose. *Flowers* small, white. *Samara* with orbicular wings not crested above the nucleus.

KHASI HILLS up to 3000 ft. Mahadeo, *Clarke!* Tharia, Wallich etc., SYLHET Wallich-No. 7264.

These sheets are in flower and had been included by Hooker under *A. Roxburghiana* A. Juss., the fruit not being known to him. Hutchinson in his revision of the Indian species of the genus (Kew Bulletin, 1917) has shown that the plant has orbicular fruits—quite different to that of the plant grouped by Hooker under this name.

Aspidopterys sp. near *A. oxyphylla* A. Juss.—A climber with glabrous or nearly glabrous branchlets. *Leaves* 4-7 by 1.2-2 in., lanceolate, acuminate, chartaceous, glabrous or slightly puberulous on the nerves beneath: lateral nerves 4-5 on either half, tertiaries subparallel; base narrowed. *Panicles* terminal or axillary, pubescent, the latter shorter than the leaves. *Bracts* leafy, upper small, grading into leaves; bracteoles minute, concave, acute; panicle branches opposite or whorled. *Panicles* racemed; pedicels articulated about the middle, glabrous in fruit, up to .6 in. long. *Flowers* not seen. *Samara* about 1 by .5-.6 in., ovate-elliptic to suborbicular elliptic, membranous, larger nerves ending in submarginal loops, nucleus not crested.

Kanjilal sheet No. 4622, KHASI HILLS—Mahadeo, 3000 ft., does not match with any named sheets at Calcutta or Dehra. The leaves match with sheets of *A. oxyphylla* in Wallich's Catalogue in Kew Herbarium. But as the Wallichian sheet is not in fruit, the plant has been tentatively separated till it can be studied with more complete material.

Fr. 10.

FAM. 29. OXALIDACEÆ.

(Engler and Prantl III. 4.15)

Generally herbs or undershrubs, rarely trees. *Leaves* alternate, compound. *Flowers* regular. *Sepals* 5, imbricate. *Petals* 5, generally contorted in bud. *Stamens* 10, of which 5 are sometimes reduced to staminodes. *Ovary* 5-celled; styles 5, distinct. *Fruit* a loculicidal capsule or a 5-lobed berry.

AVERRHOA Linn.

Averrhoa Carambola Linn. Vern. *Kordoi*, Ass.; *Kamaranga*, Beng.; *Heinohjom*, Manip.; *Amrenga*, Garo; *Thei-rhei-ol*, Kuki; *Dieng-soh-treng*, Khasi.

A small tree up to 35 ft. in height; stem irregularly fluted. *Bark* rough, dark-grey with horizontal wrinkles outside, very finely fibrous in thin layers, uniformly light reddish inside. *Leaves* imparipinnate, 4-10 in. long, exstipulate; leaflets 5-11, subopposite, 1-3 by 1-1.5 in., ovate, rhomboid or lanceolate, unequal sided, the lateral nerves gradually smaller upward, acuminate, acute at the base, entire, membranous, glabrous above, glaucous and pubescent along the midrib and nerves beneath; petiolules about 1 in. long, pubescent. *Flowers* small, variegated, white and purple, in short axillary and terminal panicles. *Calyx* glabrous, lobes 5, about 1 in. long. *Petals* 5, about .25 in. long, twisted. *Stamens* 10, 3-5 usually shorter and antherless. *Ovary* 5 ridged, sparsely pubescent. *Fruit* 3 in. long, oblong in outline, sharply 3-5-angled; *Seeds* many, arillate.

Cultivated in villages in most districts up to 2000 ft. for the fruits. Occasionally found as an escape. Two varieties with sweet and sour fruits are known.

The wood is reddish and fine grained suitable for scantlings for buildings. Twigs of the tree are kept in houses with the belief that they keep off measles.

Flrs, 8-9. Fr. 11-1.

FAM. 30. RUTACEÆ.

Trees or shrubs, usually aromatic. *Leaves* usually alternate, generally compound, exstipulate; leaflets usually with numerous translucent dots. *Flowers* regular, 2-sexual, sometimes polygamous, in simple or paniced cymes or corymbs. *Disk* annualar, more or less lobed. *Calyx* of 4-5 imbricate segments, often connate below. *Petals* ordinarily as many as the calyx-segments, usually hypogynous, imbricate or valvate. *Stamens* as many or twice as many as the petals; sometimes many; anthers 2-celled, often versatile. *Ovary* usually of 4-5, rarely more, free or connate carpels; styles 1-5, free or sometimes united. *Fruit* baccate and large, or of 1-4 indehiscent or capsular cocci, less frequently drupaceous. *Seeds* various; radicle superior.

I. Flowers usually polygamous, ovules 1-2 in each cell:—

A. Ovary deeply lobed; styles free, fruit of capsular cocci:—

Leaves opposite. Unarmed trees. ..
Leaves alternate. Armed, erect or
scandent trees or shrubs. ..

.. 1. **Evodia.**

.. 2. **Zanthoxylum.**

B. Ovary entire or slightly 2-5 lobed, styles united, fruit baccate or drupaceous :—

1. Stem prickly; scandent shrub :—
Leaves alternate, digitately tri-
foliolate. ..
2. Unarmed erect shrubs or small
trees :—
Leaves 1-foliolate opposite ;
petals 4 ; stamens 8. ..
Leaves simple, alternate, petals
and stamens each 4-5. ...

.. 3. *Toddalia*

.. 4. *Acronychia*.

.. 5. *Skimmia*.

II Flowers usually 2-sexual ; * Ovary entire, style combined, fruit baccate :—

A. Ovules 1-2 in each cell :—

1. Unarmed :—

- a. Leaves 1-5, rarely 7-foliolate ;
petals imbricate ; style per-
sistent. ..
- b. Leaves imparipinnate, style
deciduous, usually jointed to the
top of the ovary :—
Petals imbricate ; filaments dila-
ted below the subulate tip. ..
Petals imbricate, filaments subu-
late (not dilated), ovary linear
2-celled ; cotyledons fleshy
planoconvex. ..
Petals valvate, filaments subulate,
ovary 4-5 celled ; cotyledons
leafy ; crumpled. ..

.. 6. *Glycosmis*.

.. 7. *Clausena*.

.. 8. *Murraya*.

.. 9. *Micromelum*.

2. Mostly armed ; pericarp leathery :—

a. Leaves 3-foliolate :—

Flowers 4-5-merous ; leaflets
coriaceous, entire ; scandent
shrub. ...

.. 10. *Luvunga*.

b. Leaves 1-foliolate :—

Erect ; flowers small, fascicled
or shortly racemose ; disk
annular or cupular. ..

.. 11. *Atalantia*.

Often scandent, flowers large,
about 1 in. across, solitary or
fascicled, disk columnar. ..

.. 12. *Paramignya*.

B. Ovules many in each cell, stamens 10 or more :—

Leaves 1-foliolate ; pericarp leathery. ..

.. 13. *Citrus*.

Leaves 3-foliolate ; pericarp woody. ..

.. 14. *Ægle*

1. EVODIA Forst.

Evergreen trees or shrubs, unarmed. *Leaves* opposite, simple. 1-3 foliolate or imparipinnate ; leaflets punctate, usually quite entire. *Flowers* small, 1-sexual, in axillary or terminal panicles ; peduncles generally flattened. *Sepals* 4-5, imbricate. *Petals* 4-5, valvate or slightly imbricate. *Stamens* 4-5, inserted at the base of the disk ; filaments subulate, anthers oblong. *Ovary* 4-celled, deeply 4-lobed ; ovules 2 in each cell ; stigma 4-lobed. *Fruit* of 4 coriaceous, 2-valved, generally 1-2 seeded, dehiscent cocci ;

* Flowers often polygamous in *Citrus medica*.

endocarp horny. *Seeds* globose or oblong; testa blackish, horny, shining; hilum linear, often extending along the entire length of the seed; albumen and cotyledons oily.

Leaves 3-foliolate :—

Small tree; branchlets puberulous when young, inflorescence equalling or exceeding the petioles.

.. 1. *E. Roxburghiana*.

Shrub; branchlets glabrous; inflorescence much shorter than the petioles.

.. 2. *E. triphylla*.

Leaves imparipinnate :—

Leaflets usually entire and pubescent or puberulous; seeds rounded :—

Large tree; leaves aromatic, pedicels and panicle branches slender, spreading; bracts small, deciduous; capsule slightly rugose outside.

.. 3. *E. meliæfolia*.

Small tree; leaves inodorous; pedicels and panicle branches stout, compact, bracts large, persistent; capsule very rugose outside.

.. 4. *E. rutæcarpa*.

Leaflets usually crenulate* glabrous or glabrate, nervules distinct; bracts minute; capsule dotted; seeds compressed at the angles

.. 5. *E. fraxinifolia*.

1. *Evodia Roxburghiana* Benth. Vern. *Midauma-baphang*, Cach.

A tree up to 50 ft. in height and nearly 4ft. in girth with opposite branches; tender parts and inflorescence puberulous. *Bark* corky and greyish white outside, slightly reticulately fissured; inside greenish white with a touch of red, fibrous, 2·3 in. thick. *Leaves* 3-foliolate; pet. 2-6 in. long, terete. *Leaflets* 4-8 by 2·2-4·5 in., elliptic, obovate or oblong, generally acuminate, narrowed at the base, membranous, bluish green, glabrous and shining above, with close amber-coloured pellucid dots; puberulous or glabrescent beneath along the nerves; midrib impressed above, prominent beneath; lateral nerves 12-18 on either half, slender, almost horizontal at the base and slightly arched upwards; petiolules 1·15 in. long. *Flowers* diœcious, small, generally 4-merous, bracteate, in dense umbellate cymes, which are arranged in axillary or terminal panicles with spreading opposite and flattened ramifications; pedicels short, panicles as long as or exceeding the petioles. *Calyx* very small; lobes rounded with ciliate margins. *Petals* whitish, about 1 in. long, ovate oblong. *Male flowers*.—Stamens 4; filaments glabrous; disk pubescent. *Female flowers*.—Ovary pubescent; style short, thick; stigma obsoletely 4-lobed; staminodes 4. *Cocci* 4, 2-valved, globose; endocarp crustaceous; seeds black, hard, shining, 1 or 2 in each coccus, globose if single, faceted if in pairs (as in my No. 6519).

SIBSAGAR DISTRICT, between Nichugard and Garampani; N. LAKHIM PUR near Gagaldhubi, NOWGONG—Dhansiri reserve, KHASI & JAINTIA HILLS, Raliang, up to 4000 ft.

* Assam form.

Wood greyish-white, even-grained ; weighing 35-40 lbs per c. ft. ; pores scattered in small groups in zig-zag lines, medullary rays very fine.
Flrs. 8-9. Fr. 12-1.

2. *Evodia triphylla* DC.

A shrub ; young parts, common petiole, petiolules and midrib dotted with minute reddish or yellowish glands. *Leaves* aromatic, opposite, usually 3-foliate ; common petiole 3-5 in. long, slender, slightly margined towards the top. *Leaflets* 3.5-7.5 by 1.5-2.3 in., terminal usually largest, lanceolate oblong-elliptic or oblong-lanceolate, acuminate, entire, membranous, puberulous along the margins when very young, perfectly glabrous afterwards ; lateral nerves 12-16, prominent beneath, looping near the margin and forming a continuous intramarginal nerve ; base usually oblique, acute and continued into the short petiolule. *Panicles* small, much shorter than the common petiolule. *Flowers* small, on slender pedicels. *Petals* 4 ; filaments glabrous. *Ovary* puberulous, 4-celled. *Cocci* usually 4, dotted.

NORTH CACHAR HILLS—above Jatinga, 2400 ft.

Flrs. 2-3.

3. *Evodia meliæfolia* Benth. Vern. *Maiphak*, Ass, *Namsing-asing*, *Muka-asing*, Abor : *Bora-asing*, Miri ; *Theng-hanjan*, *Pag-rak* (?), Mik. ; *Machli-poma*, Sylh. ; *Dieng-si-ing*, Khasi (Shella) ; *Dieng-saw-ngiang-jerep*, Khasi (Tharia) ; *Dieng-soh-tong-klong*, Synt.

A tree up to 85 ft. in height and nearly 8 ft. in girth, rather variable in most of its characters ; branchlets generally slender, lenticellate. *Bark* greenish white, nearly smooth but covered with large lenticels ; inside uniformly pale or dun-yellow, soon turning to chocolate colour, fibrous, 2-5 in. thick, somewhat mucilaginous. *Leaves* imparipinnate ; rachis often with a sharp ridge above, otherwise terete, pubescent or glabrescent. *Leaflets* usually 9-15, sometimes as few as 3 only, opposite, 3-6 by 7-2 in., lanceolate, ovate or oblong-lanceolate, more or less unequal sided except the terminal one, long-acuminate, quite entire, thinly chartaceous, glabrous and shining above, glaucous beneath ; midrib prominent underneath, generally pubescent or puberulous, rarely glabrate on both surfaces, usually aromatic, turning yellow before falling ; lateral nerves 10-15 on either half, slender, arched ; tertiaries very finely reticulate ; base abruptly narrowed to the petiolule ; lateral petiolules 1-6 in. long, terminal, 6-12 in. long. *Flowers* very small, generally 5-merous, in umbellate pubescent cymes arranged in terminal and axillary brachiate panicles, 5-8 in. long. *Sepals* minute, obtuse. *Petals* hairy within. *Cocci* generally 5, usually 1-seeded ; seeds black, globose, hard, shining.

Occurs sporadically in all the DISTRICTS ascending to about 1000 ft.

Wood light yellowish white or grey turning light brown, even-grained, not liable to warp or split ; pores moderate sized to large ; medullary rays rather broad and continuous. It is much used for shingles by planters and for looms by the Assamese. Little or not attacked by white ants.

Flrs. 4-7. Fr. 11-1.

4. *Evodia rutæcarpa* Hk. f. & Thom. Vern. *Bora-asing*, Miri; *Muka-asing*, Abor.

A shrub or a small tree about 30 ft. in height clothed with velvety pubescence. *Leaves* imparipinnate, 12-18 in. long; rachis nearly terete, velvety; leaflets 3-5 pairs, usually inodorous, 2.5-6.2 by 1-2 in., lanceolate or oblanceolate, acuminate, entire, lateral nerves up to 10-15 on either half, more densely hairy on the undersurface; base unequal, usually narrowed to the very short petiole. *Flowers* 4-5 merous, small in brachiate cymes; peduncles of cymes and panicle branches stout; panicles 3-4.5 in. across; bracts up to 4 in. long, persistent. *Petals* pubescent within; filaments hairy, anthers large. *Capsule* 3 in. across, rugose outside, cocci 4.

KHASI HILLS—Rang-kheng-sning at about 5000 ft. and also probably in N. E. FRONTIER between Kobo and Pillang (material insufficient for determination).

Flrs. 7-8? Fr. 9.

5. *Evodia fraxinifolia* Hk. f. Vern. *Dieng-sngiyat*, *Dieng-borapram*, Kh., *Dieng-sah-iaru*, *Dieng-sa-tyng-klong*, *Dieng-subu-klong*, Synt.

Small to moderate sized tree. *Bark* brown or light to ashy grey rather smooth but warty with rather large lenticels, yellowish white inside; young shoots pubescent. *Leaves* 8-14 in. long, rachis slightly ridged above; leaflets usually 9-11, sometimes only 5, 3.5-8 by 1.2-3 in., lanceolate or oblong-lanceolate, finely acuminate, usually crenulate with a gland at each sinus, thin, glabrous when mature or puberulous on the midrib above; lateral nerves 12-15 on either side, nervules finely reticulate, distinct; base unequal, usually narrowed and often continued into the short petiole. *Cymes* brachiate, panicles shorter than the leaves, spreading, branches compressed, finely pubescent; bracts minute; pedicels short. *Flowers* greenish-white; sepals small; petals pubescent within, much longer. MALE FLRS.—*With* 4 rudimentary carpels; filaments somewhat hairy. FEMALE FLRS.—*Ovary* glabrous. *Capsule* red, cocci usually 4; seeds rather compressed, dark brown.

KHASI & JAINTIA HILLS 3000-5000 ft.

Flrs. 5-6. Fr. 2.

The leaflets are sometimes entire but in all Assam specimens examined by me they are crenulate.

2. *ZANTHOXYLUM* Linn.

(*Fagara* Schreb.)

Trees or shrubs, sometimes scandent, and generally armed with prickles, those on stem and larger branches on a conical corky base. *Leaves* alternate, 3-foliolate or imparipinnate, rarely paripinnate; leaflets opposite or alternate, entire or crenate, punctate, aromatic. *Flowers* small, often 1-sexual, in axillary or terminal peduncled, panicked cymes. *Calyx* 3-8 fid or rarely 0.

Petals 3-5, rarely 0, imbricate or induplicate-valvate. *Disk* small or obscure. *Stamens* 3-5, reduced to scales in female flowers, rudimentary in male flowers, hypogynous. *Ovary* rudimentary in male flrs.; of 1-5 oblique carpels in female flrs.; styles sublateral, free or connate at the apex; ovules 2 in each cell, usually collateral. *Fruit* of 1-5, 1-seeded carpels, which dehisce ventrally, endocarp horny. *Seeds* shining, blue or black; albumen fleshy; cotyledons flat.

I. Leaves imparipinnate :—

A. Trees or erect shrubs :—

1. Rachis not winged; panicle branches opposite; petals present :—

a. Leaflets entire, ovate or ovate-lanceolate, caudate acuminate, rather membranous, pale or glaucous beneath. Flrs. 4-merous. Prickles on old stems somewhat distant, aerial roots 0. ..

.. 1. *Z. Rhetsa*,

b. Leaflets crenulate lanceolate or oblong lanceolate with a prominent gland at each crenature, caudate acuminate, subcoriaceous, green beneath. Flrs. 4-merous, aerial roots 0. ..

... 2. *Z. Budrunga*.

c. Leaflets crenulate, elliptic or oblong, abruptly short acuminate, very coriaceous, pale green beneath. Flrs. 5-merous, aerial roots often present. ..

.. 3. *Z. myriacanthum*.

2. Rachis winged, panicle branches alternate, petals 0 :—

Leaflets entirely glabrous, glossy above. Flowers yellowish, cymes in lax panicles, usually exceeding 1 in. ..

.. 4. *Z. alatum*.

Leaflets puberulous on both surfaces not glossy above. Flrs. purplish; cymes dense, usually under 1 in. long. ..

.. 5. *Z. acanthopodium*.

B. Scandent shrubs, panicle branches alternate; petals present :—

I. Leaflets 3-6 in. long :—

Leaflets 7, all opposite. ..

.. 6. *Z. Hamiltonianum*.

2. Leaflets under 3 in. long, leaflets 7-21 :—

a. Leaflets alternate and opposite crenate. Flowers large, umbelled on the branches of panicles, ..

.. 7. *Z. oxyphylum*.

b. Leaflets mostly alternate, entire or minutely crenulate. Flowers minute not umbelled. ..

.. 8. *Z. khasianum*.

II. Leaves trifoliate, erect trees, panicle branches alternate. ..

.. 9. *Z. ovalifolium*.

1. *Zanthoxylum Rhetsa* DC. Vern. *Bajarmani*, *Bajarmali*, Ass. *Onger-asing*, Miri & Abor; *Hanjor*, *Theng-nang-arong*, Mik.; *Malaphang*, *Thenthe-lau-phang*, *Jingir-phang*, Cach.; *Jur-thoum-thing*, Kuki; *Hechui-ching*, Naga; *Bolmicheng*, *Shumi-chheng*, Garo, *Dieng-soh-mirik*, Khasi (Isamati); *Dieng-nadkor*, Khasi (Shella); *Dieng-soh-aruin*, Khasi.

A deciduous tree up to 75 ft. in height and 4-5 ft. in girth, with a large crown, covered with sharp prickles, those on the

branches incurved, and on the trunk with conical corky bases; pith large, septate with thin transverse membranes. *Bark* corky and pale yellow outside; light-brown inside, soon turning dark-chocolate on exposure. *Leaves* paripinnate or imparipinnate, crowded at the ends of the branchlets, 1-2 ft. long; rachis terete, glabrous. *Leaflets* 16-25, opposite, 3-5 by 1·2-2 in., subfalcately oblong or ovate-lanceolate, very unequal sided, caudate-acuminate, the larger half rounded at the base, the smaller half cuneate and above the base of the other half, quite entire, membranous or thinly coriaceous, glabrous and shining above, glaucous underneath at least when young, turning yellow before falling, very faintly or not at all aromatic; main lateral nerves in the larger half up to 22, in the smaller 2 or 3 fewer, almost straight; pellucid dots extremely minute or invisible; petiolules 15-5 in. long. *Flowers* small, 4-merous, light-green or pale yellow, in large crowded terminal and subterminal puberulous panicles of cymes with opposite branches up to 9 in. long; bracts minute, caducous; pedicels very short; sometimes prickly. *Calyx lobes* minute, triangular, acute. *Petals* 4, elliptic, or elliptic-obovate, valvate. *Anthers* versatile. *Ripe carpels* globose, 2-valved. *Seeds* solitary, globose, 2 in. across, bluish-black, shining.

Sporadic throughout the PROVINCE, but gradually more scarce in the UPPER DISTRICTS ascending to about 2000 ft.

Wood yellowish grey, close grained, moderate hard; pores scanty in the brownish autumn wood; annual rings marked by a thin band of soft tissue of light colour; weight 40 lbs. per c. ft. The cork from the base of the prickles of the trunk is turned into beads and other articles of ornament by the Cacharies and the tender leaves are eaten cooked by the Aitonias. In Southern India the unripe carpels and the seeds are used as condiments. An essential oil is obtained from the fruit, which is used medicinally.

Flrs. with new leaves 3-4, Fr. 11-12.

2. *Zanthoxylum Budrunga* Wall Cat. Vern. *Bajarmuni*, Ass.; *Buxarnali*, Ass. (Kam.); *Bajna*, Ass.; *Bux-ruli*, Mech; *Chingirphang*, *Bajrang*, Cach., *Tingang-arong*, Mik.; *Ongret*, Naga; *Bajrang*, Sylh.; *Nyngdong*, Manip.; *Sing-i-te*, Kuki; *Sumet-chheng*, Garo; *Dieng-ka-synrang*, Khasi.

An evergreen tree up to 50 ft. in height and 4 ft. in girth, very doubtfully different from the preceding species and very difficult to separate it from herbarium material. *Size* for *size* the trunk is very much more closely studded with prickles which have also larger corky base about (3 by 2 by 2·5 in.), and the branches are fewer and crowded at the top of the tree, the crown being consequently more or less flat-topped. *Bark* grey and finely reticulately fissured outside; green underneath the corky layer, inner layers pale with streaks of purplish tissue, both soon turning deeper on exposure. *Leaves* 1-2·5 ft. long, generally imparipinnate; rachis sometimes armed. *Leaflets* 15-21, opposite, 3-6 by 1-1·5 in., oblong-lanceolate, very oblique, caudate-acuminate, distantly crenulate with a large reddish pellucid dot at each sinus or entire, quite glabrous, aromatic, turning yellow before

falling; main lateral nerves 20-22 up to the base of the acumen in the larger half, 2-3 fewer in the other half; pellucid dots minute or fairly large; petiolules .1-15 in. long. *Flowers* minute, greenish-white in 3-chotomous cymes arranged in crowded terminal panicles; peduncles sometimes armed. *Petals* 4. *Fruit* and *seed* as in *Z. Rhetsa*.

Throughout the province extending to low foot hills, fairly common in many districts.

Wood close grained, moderately hard, uniformly white, with pores uniformly distributed; annual rings sharply marked by a thin line of soft tissues; weight about 48 lbs. per c. ft. The Kukis prize the wood for house post and the Meches use it for looms. The leaves are known to be edible, the cork of the prickles is used in the same way as of *Z. Rhetsa* and the fruit and seeds have the same economic uses. The Nagas catch fish by poisoning the water with the powder of the seeds.

Flrs. 3-4. Fr. 8-9.

3. *Zanthoxylum myriacanthum* Wall. ? (or nov, sp. ?).

A large evergreen tree up to 70 ft. in height and nearly 5 ft. in girth, often with strong aerial roots; all parts excepting the ramifications of inflorescence perfectly glabrous; branchlets fleshy, covered with slightly incurved sharp prickles. *Bark* grey, with sharp prickles and transversely oblong corky protuberances near the base; dun-yellow inside. *Leaves* paripinnate, 9-14 in. long; rachis armed; peduncle 5-6 in. long. *Leaflets* 6-8 (?), opposite or subopposite, 4-7 by 2-3 in., oblong or elliptic, abruptly short acuminate, slightly oblique but generally unequal-sided at the base, which is rounded on both halves, minutely crenulate, very coriaceous, dark-green and shining above, pale-green and also shining beneath, very aromatic, pellucid dots large—containing fragrant essential oil; main lateral nerves about 18 in larger half, one or two fewer in the smaller half, arched, bifurcating beyond the middle; petiolules .1-6 in. long. *Flowers* 5-merous, very small, bracteolate, crowded in much branched spreading paniced cymes; ramifications of inflorescence patently puberulous; bud globose. *Calyx-lobes* rounded, glabrous. *Petals* 5, orbicular, glabrous, strongly imbricate. *Filaments* short, tapering, glabrous. *Carpels* up to 3 in the female flowers. *Ripe carpels* not seen, but assuming that the tree has been correctly identified, they ought to be, according to the Fl. Br. Ind., .12 in. cross., compressed, apiculate.

Only found in the Dulong Reserve, NORTH LAKHIMPUR.

Wood golden yellow when fresh-cut, afterwards tan-brown; pores large, often in strings of 2-6; medullary rays fairly broad and equidistant showing conspicuous silver-grain on a radial section; annual rings marked by a very thin line of softer tissue. Weight about 32 lbs. per c. ft. It seems to be suitable for tea boxes.

Flrs. 3-4.

4. *Zanthoxylum alatum* Roxb.

A small, strongly aromatic tree attaining about 25ft. or a shrub; young shoots glabrous. *Prickles* straight or incurved from a broad base which is enlarged and becomes woody in old stems.

Bark greyish brown in old trees with corky furrows, twigs grey or greenish grey smooth, but lenticellate. *Blaze* yellowish, turning blackish-brown. *Leaves* imparipinnate, rachis 2-4 in. long, glabrous with foliaceous wings which are broader upwards, jointed at the insertion of leaflets. *Leaflets* 5-11, opposite, 1-4 by 1-4-1-2 in., lower smaller, narrow to oblong lanceolate, subacute, obtuse or acuminate, glabrous, dark green and shining above, paler beneath, subcoriaceous; lateral nerves 10-16 on either half, bifurcate near the margin, serrulate or subentire, prominently pellucid punctate on each serrature and sparsely elsewhere; base more or less oblique; petiolule 0 or very short. *Flowers* small, yellowish in lax pyramidal pubescent panicles 1-2 in. long, terminating lateral shoots or axillary; pedicels short. *Calyx* 6-8, linear. *Petals* 0. *Stamens* 6-8, in male flowers. *Ripe carpels* 1-2, less often 3, in each fruit, red, size of a pepper-corn, somewhat compressed, tubercled; seeds black, globose, rugose.

KHASI HILLS 2-6000 ft. often in the vicinity of villages where it is sometimes planted in hedges.

The ripe fruits are used as a specific for toothache.

Fls. 4-6 ? Fr. 10-11.

Differs mainly by its glabrous rachis and leaflets and laxer inflorescence from the next species and is doubtfully specifically different.

5. *Zanthoxylum acanthopodium* DC. Vern. *Jayurkhlan*, *Dieng-soh-mio*, *Soh-jing-buin*, *Dieng-jaior-khlaw*, *Dieng-soh-maijur*, *Dieng-soh-khlam*, Khasi; *Jaur*, *Dieng-ja-iaur*, Synt.

A straggly thorny aromatic shrub or small tree; young shoots pubescent or puberulous. *Bark* greenish grey, smooth and lenticellate in young stems; greyish, corky and reticulately fissured when old. *Blaze* greenish; prickles nearly straight or incurved from a broad base, polished and enlarged with woody base in old trees. *Leaves* imparipinnate, rachis 2-4 in. long, puberulous, with foliaceous wings which are gradually broader upwards, jointed at the insertion of leaflets, usually prickly when young; leaflets 5-9, 13 according to some authorities, rarely 3, opposite, 1-4 by 1-5-1-2 in., smaller downwards, elliptic oblong or ovate, acute, acuminate or subacute at the apex, serrate or serrulate, prominently pellucid-punctate at each serrature, elsewhere glands few, not prominent, pubescent or puberulous along the nerves on both surfaces; lateral nerves 14-19 on either half, bifurcating near the margin; midrib prickly in young leaves; base often oblique; petiolules 0 or very short. *Cymes* often in pairs from leaf axils, dense, about 1-5 in. long, puberulous. *Flowers* purplish, small; pedicels very short. *Calyx* 6-8 lobed; lobes linear, ciliate. *Stamens* 6-8 in male flowers. *Fruit* forming dense sessile clusters; ripe carpels 1-3 in each fruit, red; seeds globose, similar to that of last species.

KHASI HILLS up to 6000 ft.

Fruit is said to be used for killing fish.

Fls. 9-10 Fr. 12.

6. *Zanthoxylum Hamiltonianum* Wall. Vern. *Texmoi*, *Tejmai-bih*. Ass. (common) ; *Texmuri*. Ass. (Numaligarh) ; *Bagh-anchora*, Ass. ; *Rikam-ruibi*, Miri ; *Changre*, Naga ; *Tes-moi*, Mech.

A large evergreen scandent shrub, armed with recurved prickles which, on very old stems have more or less cylindrical and corky bases ; young parts pubescent or velvety ; pith small, not septate. *Bark* dark-grey outside, cream-coloured inside. *Leaves* imparipinnate, 9-15 in. long ; rachis terete, pubescent or glabrous, armed with recurved prickles. *Leaflets* 5-7, the lateral opposite 3-7 by 1·7-3 in., ovate, oblong or elliptic, abruptly or gradually narrowed into a broad emarginate apex, rounded or subacute at the base, scarcely oblique, usually entire, chartaceous, shining on both surfaces, wholly glabrous or pubescent along the midrib beneath, which is sometimes armed with a few recurved prickles, generally with a few large pellucid dots filled with an essential oil ; main lateral nerves 10-15 on either side of the midrib, arched, generally looping ; petiolules 1·15 in. long. *Flowers* about 2 in. across, dull-white, shortly pedicelled, in slender, puberulous axillary fascicled cyme-bearing panicles 1·5-3 in. long. *Calyx lobes* minute, triangular-ovate. *Petals* 4-5, ovate, subimbricate. *Filaments* about 12 in. long, very slender ; anthers basifixed. *Fruiting carpels* 2-4, rarely 5, 1·6 in. across, obliquely set, globose, somewhat compressed, pitted outside ; seeds pitted, brownish black, very glossy.

Fairly common throughout the province in low level forests except in KHASI AND JAINTIA HILLS.

Wood pale yellow, compact ; pores orbicular, rather small for a climber ; medullary rays nearly equidistant, somewhat wavy. The fruit is used for poisoning fish.

Flrs. 3-4. Fr. 5-6.

7. *Zanthoxylum oxyphyllum* Edgw. Vern. *Mexenga*, Ass. (Lakh).

At first a slender erect shrub but afterwards scrambling on trees, very aromatic, glabrous, prickles usually hooked ; pith large, septate. *Leaves* 6-14 in. long, rachis armed with prickles beneath and with 2 faint longitudinal ridges above. *Leaflets* strongly aromatic, very variable in size and shape, opposite and alternate, 1-3 by 5-1·6 in., elliptic or lanceolate, often taper-pointed, subcoriaceous, entire, crenate or crenulate with a large translucent gland at each sinus ; lateral nerves 10-12 on either side of the midrib ; base acute ; petiolules 0·5-2 in. long. *Flowers* 4-merous, 15-3 in. across, umbelled in much branched paniced axillary cymes ; pedicels slender. *Petals* obtuse, imbricate. *Ripe carpels* 2-4, tubercled. *Seeds* 15 in. across, globose, blue-black, shining.

Makum, LAKHIMPUR ; near Nazira, SIBSAGAR and in the Charduar Reserve, DARRANG, Adgiri, GARO HILLS (record based on fragmentary material). KHASI HILLS 4-6000 ft. F. B. I.

The tender shoots are eaten cooked as a vegetable.

Flrs. 4-5. Fr. 8-9.

8. *Zanthoxylum khasianum* Hk. f. Vern. *Soh-mrit*, *Dieng-tiw-shiah*, *Soh-umiw*, Kh.

A large aromatic woody climber or straggling shrub ; young parts and inflorescence very pubescent. *Bark* thin, rough, grey ; prickles recurved. *Leaves* imparipinnate ; rachis very variable in length, ordinarily 4-11 in., often with sharp recurved prickles, channelled, at first pubescent, glabrate with age ; leaflets very variable 9-19, rarely 21, alternate, subopposite or less often opposite, 1.2-2.2 by .5-.8 in., often oblique, elliptic or oblong-elliptic, apex often subfalcate, bluntly acuminate, generally caudate, minutely crenulate, glandular at crenatures, shining, glabrous or puberulous along the lower half of midrib on either surface ; lateral nerves 7-10 on either half ; base often unequal, narrowed to the petiolule ; petiolules margined, up to .15 in. long. *Flowers* greenish, about .1 in. long, in panicles of cymes up to 2.5 in. long ; panicle branches alternate ; bracteoles ovate ciliate. *Calyx* lobes 4, ovate-oblong, obtuse, ciliate on the margins, up to .15 in. long. *Petals* obovate, concave. *Stamens* 4 in male flowers. *Carpels* 4 in female flowers. *Drupels* 1-3, slightly compressed, obovoid, of the size of a pepper corn with aromatic, pellucid dots ; rugose when dry. *Seeds* globose, shining, black, slightly uneven.

KHASI HILLS 5000-6400 ft.

Sometimes the rachis is very short, 2 in. only with as few as 7 leaflets and totally unarmed.

Flrs. 5. Fr. 9-10 ?

Zanthoxylum sp., Vern. *Kunja-shia-khuat*, Kh. ; *Dieng-tinat-syar* (lit. cock's spur) Synt., closely allied to the above, scandent ; leaflets up to 41, 6-1 by .3-.5. Flrs. and fruit not seen.

KHASI HILLS, Raithwan, Nong-kersein, Upper Shillong etc.

9. *Zanthoxylum ovalifolium* Wight. Vern. *Dieng-sinialh*, *Tew-kalong*, *Dieng-shih*, Kh.

A small aromatic tree or shrub, sometimes unarmed. *Bark* grey or brownish with pale streaks outside, pale yellowish, turning light brown inside, prickles slightly incurved or straight from broad bases, conical on old stems ; branches lenticellate, glabrous ; buds tomentose. *Leaves* trifoliolate, sometimes 1 or 2 ; leaflets aborted ; common petiole 1.7 in., slightly margined. *Leaflets* 2.5-6.5 by 1.2-2.4 in., lanceolate, elliptic or obovate, blunt acuminate, usually with emarginate tip, obscurely crenate, crenatures glandular, coriaceous, glabrous on both surfaces, lateral nerves prominent beneath, 14-16 on either half, mostly forming loops near the margin, with many intermediate ones, base tapering or narrowed to the short margined petiolule ; petiolule up to .1 in. long. *Flowers* small, 4-5 merous, greenish in pubescent axillary and terminal peduncled panicles of cymes shorter than the leaves ; bracts and bracteoles minute, acute, panicle branches alternate. *Calyx* lobes minute, triangular, acute.

Petals about .1 in. long, obtuse, valvate. *Ripe carpels* red, solitary, size of a pea, slightly pitted; seeds globose, black, shining.

KHASI HILLS 4-5000 ft.

Wood light yellowish white, hard, close grained.

Flrs. 5. Fr. 10-1.

3. TODDALIA Juss

Toddalia aculeata Pers. Syn. *T. asiatica*, Lamk. Sans. *Dahaka*, *Kanchana*. Vern. *Warplap-rikang*, Mik.; *Mulkiber-doukha*, *Ingeorach*, *Newraji-doukha*, Kach.; *Ling-seru*, Kuki; *Nachi-wagum*, Garo.; *Soh-sat-khlaw*, Khasi (Nongston); *Shia-sien-ung*, *Sia-soh-sat*, Khasi; *Saryng-khlem*, Synt.

A large scandent evergreen shrub armed with curved or straight prickles, those on large stems on large conical bases; young shoots rusty tomentose. *Leaves* alternate, 3-foliate; common petiole .7-1.7 in. long. *Leaflets* sessile, 1.5-4 by .6-1.5 in., obovate, oblanceolate or lanceolate, usually bluntly long-acuminate, cuneate at the base, crenulate or subentire, more or less coriaceous, glabrous, minutely pellucid-punctate, aromatic, pungent to the taste; lateral nerves many, slender, straight. *Flowers* white or pale yellow, unisexual .2 in. across, usually in pubescent axillary cymes, which are often paniced; panicles sometimes terminal; bracts minute; pedicels very short. *Calyx* 5-lobed, small, glandular, pubescent outside. *Petals* 5, induplicate-valvate, about .1 in. long, oblong or lanceolate, hooded at the apex, gland-dotted. *Disk* fleshy, grooved, glabrous. MALE FLRS.—*Stamens* 5: filaments slender and longer than the petals; anthers round with a gland on the back; ovary rudimentary, cylindric-oblong. FEMALE FLRS.—*Staminodes* 0. *Ovary* 4-celled, more or less 5 grooved; style very short or 0; stigma 5-lobed; ovules 2 in each cell, superposed. *Fruit* a globose berry, .3-.4 in. across, generally 5-grooved or -lobed, pale-orange when ripe, pitted on the rind. *Seed* one in each cell, reniform, rounded on the back; testa coriaceous; embryo curved, terete.

Generally in shady and swampy localities in all the DISTRICTS particularly DARRANG, ascending to 6400 ft. in KHASI HILLS.

The bark of the roots yields a yellow dye and a bitter aromatic tonic which is believed to be more efficacious as an antiperiodic than quinine. It contains small quantities of the alkaloid Berberine. The fruit is often attacked by insects which change them into galls of various shapes and sizes. Wood yellow.

Flrs. 1-10, Fr. 8-1.

4. ACRONYCHIA Forst.

Acronychia laurifolia Bl. Vern. *Ing-long-pharse-arong*, Mik., *Kogema-iaopa-phang*, Kach., *Paling-changne*, Daff.; *Bol-thimatchi*, *Bolgrak*, Garo; *Dieng-soh-phlang*, Khasi; *Sarmon-blai*, *Dieng-soh-newriong-blei*, Synt.

A small unarmed evergreen tree up to about 40 ft. in height and nearly 3 ft. in girth; young shoots glabrous. *Bark* grey or brown, corky outside, about .5 in. thick; inside greenish brown on young stems, reddish with fine white streaks on mature trees, sweetish to the taste and aromatic. *Leaves* usually opposite, 1-foliolate. *Leaflets* 3-6 by 1-2.2 in., oblong or obovate-lanceolate, obtusely acuminate, entire, thinly coriaceous, aromatic with the smell of green mango, glabrous, shining above, pale green or glaucous beneath, turning yellow before falling; translucent dots minute; lateral nerves about 12 on either half, joining to form a much looped jagged intermarginal nerve well away from the margin; base acute; petiole .3-1 in. long, slightly channelled, somewhat dilated at the base and swollen at the upper extremity where the blade is articulated. *Flowers* white, faintly scented, polygamous, in long peduncled, paniculately corymbose axillary cymes; peduncles up to 3 in. long, panicle branches upto 1 in. long; pedicels .2 in. long, slender; buds oblong. *Calyx* very small, lobes 4, acute. *Petals* 4, valvate, .2 in. long, tapering to a more or less cucullate tip, hairy at the base inside. *Disk* thick, hairy. *Stamens* 8, shorter than the petals and alternately longer; filaments very finely pointed. *Ovary* 4-celled with 2 superposed ovules in each cell. *Fruit* a capsule, .8-5 in. diam., usually 4-lobed and beaked, glabrate.

Throughout ASSAM ascending to about 4000 ft. in KHASI HILLS (near Cherrapunji).

Wood pale-white, fine and even-grained, weighing about 40 lbs. per c. ft.

Flrs. 12-4. Fr. 11-2 (of the following year?).

5. SKIMMIA Thunb.

Skimmia laureola Hk. f.

An aromatic evergreen shrub up to 10 ft. high branched from the base, all parts glabrous. *Bark* greyish-white, smooth; branches with scattered warty lenticels. *Leaves* crowded at the ends of branches alternate, simple, very variable in size and shape, 2-5 by .7-1.6 in., oblanceolate, lanceolate or oblong-lanceolate, acuminate, softly coriaceous, glabrous, dark green above, paler beneath, lateral nerves indistinct, midrib prominent; base narrowed; petiole narrowly margined, .2-.5 in. *Flowers* white or greenish yellow, polygamous, .8-.5 in. across in terminal erect usually compact panicles, .7-2 in. long; bracts .1 in. long, persistent, ovate oblong, acute, ciliolate; bracteoles similar but small, deciduous; pedicels very short. *Calyx* persistent, lobes imbricate, suborbicular-ovate, obtuse, ciliolate. *Petals* 5, subimbricate, about .15 in. long, oblong, much longer than the calyx. *Disk* obsolete. *Stamens* 5, hypogynous about as long as the petals; filaments subulate; anthers dorsifixed. *Ovary* ovoid. 2-5 celled; ovule 1 in each cell, pendulous from the top; style stout; stigma capitate, 2-5 lobed. *in male flowers* ovary usually of 2-3 (sometimes up to 5) rudimentary carpels, free except at

base, free ends subulate. *Fruit* subglobose. 3-4 in. across, containing 3-2, sometimes 1, cartilaginous 1-seeded stones, albumen fleshy ; cotyledons flat.

KHASI & JAINTIA HILIS—Lumsuiyar (Dumpep) 6390 ft.-not common.
Flrs. 4, sometimes 11-a second flush ? Fr. rainy season.

6. GLYCOSMIS Correa.

Glycosmis pentaphylla Corr. incl. *G. arborea*, DC. Vern. *Hengna-poka*, *Hengena-poka*, Ass. (Sib.) *Tultha-poka*, Ass. (Now) ; *Chagol-ladi*, *Chaul-dhowa*, Ass. (Kam) ; *Pleg-ik-arong*, *Hiunmuchu*, *Theng-lokso-arong*, *Jami-reng-reng-arong*, *Chingchor-arong*, *Thengpitungmeng*, *Wo-chora-a-anarong*, Mik. ; *Tasung-changne*, Daff. ; *As-sera*, Beng. ; *Mathhila*, E. Bengal ; *Bon-jamir*, Sylh. ; *Dieng-soh-sning*, *Dieng-kasiar*, Khasi ; *Dieng-kajat-ske*, Synt. *Serebilijira*, Cach.

An evergreen shrub or small tree up to 15 ft. in height with corky grey or blackish bark. *Leaves* imparipinnate, rachis variable up to 3.5 in. long. *Leaflets* 1, 3 or 5, very rarely 7 usually alternate, very variable in size and shape, 3-12 by 1-5 in., elliptic, ovate, obovate oblanceolate or lanceolate acute or acuminate, entire or crenulate, thinly chartaceous, dark green above, pale beneath, giving an unpleasant smell when bruised ; translucent dots not distinct, lateral nerves 8-10, anastomosing at the outer extremities, tertiaries laxly reticulate ; base cuneate or acute ; petiolule usually up to about 2 in. long, sometimes more. *Flowers* variable in size, generally in axillary but sometimes also in terminal rusty often furfuraceous, pubescent or puberulous erect panicles, very short to 4 in. long ; bracts small, ovate acute ; pedicels minute. *Calyx-segments* 4-5, imbricate, more or less rounded, ciliolate. *Petals* 4-5, imbricate, 2 in. long, obovate. *Stamens* twice as many as the petals ; filaments subulate, free ; anthers introrse, with a dorsal or apical gland. *Ovary* sunk in the disk or more or less free, more or less rugose with glands ; style short. *Fruit* a berry, white or pinkish when fully ripe.

Of this very variable plant several varieties and subvarieties are recognized by Hooker but all more or less connected by intermediates. The forms commonly found in our area may be classified as follows :-

Var. I.—*Leaves* usually 3, less often 1-or 5-foliolate, large oblong or obovate-lanceolate, entire or obscurely crenulate ; panicles elongate, many flowered, often towards the ends of the branches ; ovary usually rugose with mamillate glands, 5-celled, connate at the base with the disk.

Var. II.—*Leaves* 3-5 foliolate, rarely 1-foliolate (Sub var *longifolia*) ; panicles small, few-many flowered ; ovary 4-5 celled, constricted at the base and thus free from the disk, scarcely mamillate.

Sub var. 1. *longifolia* Hk. f. *Leaves* 1-foliolate, large, often acuminate, panicles short.

Sub var. 2. *macrophylla* Hk. f. *Leaves* 3-5 foliolate or 1-foliolate, disk thick, broader than the ovary.

Sub var. 3. *angustifolia* Hk. f. *leaflets* usually 3-5, not large, narrow and lanceolate, entire, panicles short, sometimes arboraceous.

Mostly low hills--N. CACHAR, KHASI HILLS up to 2000 ft.

Sub var. 4? Often attaining the dimension of a small tree; leaflets 3-5, sometimes 1, usually acuminate, large to medium sized; style long almost equalling the ovary.

Ascending to 2000 ft. in the KHASI HILLS.

Generally in the neighbourhood of swamps or on banks of sluggish streams or under bamboo and mango-topes, all over the province, ascending to about 2000 ft.

Wood white, compact, suitable for tent-pegs, handles of tools etc. *Branchlets* are used as tooth-brushes. The ripe berries are edible.

Flrs. & Fr. 1-4, often throughout the year.

7. CLAUSENA Burn.

Unarmed shrubs or small trees. *Leaves* imparipinnate, deciduous; leaflets alternate. *Flowers* small, 4-5 merous, in terminal or axillary paniced cymes or racemes. *Calyx* 4-5 lobed or partite. *Petals* imbricate. *Stamens* 8-10; filaments alternately shorter, abruptly dilated below the subulate tip. *Ovary* stipitate, usually 4-5 celled; style deciduous. *Berry* oblong or globose. *Seeds* with membranous testa; cotyledons plano-convex.

Small shrub. Leaflets never exceeding 11 in number, glabrous. Ovary glabrous.

.. *C. heptaphylla*.

Large shrub. Leaflets never less than 15 in number, pubescent beneath. Ovary hairy.

.. *C. excavata*.

1. *Clausena heptaphylla* W. & A. Vern. *Kebu-taye*, Abor; *Dieng-siang-mat*, Khasi (Nongkla); *Ja-lamari*, Khasi (Shella); *Santhlung-suurhui*, Lush.; *Arhit-thi*, Kuki.

A small bushy shrub, smelling of aniseed; branchlets thin, glabrous, terete. *Leaves* 9-15 in. long; petiole terete, as thin as branchlets, glabrous or minutely pubescent; leaflets 9-5, rarely 11, 2-6 by .5-2 in., elliptic-lanceolate, caudate, usually emarginate, tapering to an acute base, slightly crenulate, membranous or thinly coriaceous, glabrous, pale beneath; translucent dots of unequal sizes, thinly scattered; main lateral nerves slender, 6-8 on either side of the midrib; base more or less oblique; petiolule .1-15 in. long. *Panicles* terminal and axillary, 1-4 in. long, with short slender spreading racemose branches. *Calyx-lobes* 4-5, short, broadly oblong-ovate, acute. *Flowers* .15 in. diam., on slender short panicles. *Petals* 4-5, white, fading to pale yellow, oblong glabrous. *Ovary* 4-grooved, glabrous. *Berry* .5 in. long, glandular, orange or red when ripe.

Pillung, N. E. FRONTIER, not common, LUSHAI HILLS-Tipaimukh; CACHAR-Sonai reserve, KHASI & JAINTIA HILLS up to 2000 ft.

The leaves are chewed with *pan* leaves and are also used for flavouring tobacco.

Flrs. 4-5. Fr. cold season.

2. *Clausena excavata* Burn. Vern. *Narasingha*, Ass. (Sib.); *Bengjari*, Ass. (Nowg.); *Theng-sah-soh-arong*, Mikir; *Samdaukhi*, Kach.; *Sam-sweg*, Garo; *Dieng-tyrur*, Khasi.

A large shrub 8-12 ft. high, sometimes a small tree up to 20 ft. in height, unpleasantly aromatic, closely resembling

Murraya Kœnigii Spreng, in this respect, also in foliage and habit ; young parts and inflorescence grey-tomentose. *Leaves* 8-30 in. long ; rachis terete, tomentose ; leaflets 15-30, rarely up to 35, shortly petioluled, 1-3 by .3-1 in., obliquely-oblong to ovate-lanceolate, acute, finely crenulate, with large marginal translucent pubescent glands, membranous, pubescent beneath. *Panicles* 4-12 in. long with spreading (alternate cyme-bearing) branches ; pedicels slender up to .15 in. long. *Flowers* tetramerous, .15 in. across, dull-white ; calyx lobes hairy, broad, acute ; petals oblong, glabrous ; ovary villous. *Fruit* .75 in. long, oblong or obovate.

Fairly common under sal in NOWGONG and also GARO HILLS, N. CACHAR HILLS, Dimapur-SIBSAGAR, KHASI HILLS-foot hills, Shella.

The leaves and twigs are put to much the same uses as those of *Murraya Kœnigii* Spreng-also used medicinally.

Flrs. 3-4.

C. sufruticosa W and A. An undershrub growing in shade in deep jungle. *Leaves* imparipinnate, common petiole terete, tomentose, 10-15 in. long. *Leaflets* 5-17, 1.5-4 in. long, ovate to lanceolate, acute or acuminate, entire, softly tomentose (often silky) especially when young, more densely beneath, very oblique at the base ; petiolule short. *Panicles* 2-5 in. long, lax below the leaves and at the base of current year's shoots ; pedicels filiform, .2-.4 in. long. *Flowers* .2 in. across, sepals 4, ovate, acuminate, puberulous outside. *Petals* 3-4, slightly imbricate, oblong-obovate, blunt, slightly glandular puberulous. *Stamens* 8, free, hypogynous ; filaments dilated below. *Ovary* 4-celled on a hypogynous disk ; style cylindrical, thick ; stigma terminal. *Fruits* not seen.

KHASI HILLS, *De-Silva* ! LUSHAI HILLS, *Gage* ! ASSAM, *Simmons* ! CHITTAGONG HILL TRACTS ; *Prain's* collector ! *Lister* ! *Gamble* !

Flrs. 3-6.

8. *MURRAYA* Linn.

Unarmed shrubs or small trees. *Leaves* alternate, imparipinnate. *Leaflets* alternate, petioluled. *Flowers* 2-sexual, in cymes or corymbs, generally terminal, sometimes solitary. *Calyx* 5-fid. *Petals* 5, valvate, slightly imbricate. *Stamens* 10 ; filaments subulate, alternately shorter ; anthers short. *Ovary* usually 2-celled ; style simple, long, articulated, deciduous. *Fruit* a berry. *Cotyledons* fleshy, plano-convex.

An evergreen shrub or small tree. *Leaflets* 3-9, glossy green. *Flowers* 1 in. long. Ripe fruit red. .. 1. *M. exotica*.

A deciduous shrub. *Leaflets* 9-25, dull green.

Flowers scarcely .5 in. long. Ripe fruit black. .. 2. *M. Kœnigii*.

1. *Murraya exotica* Linn. Vern. *Kamini*, Beng. and Ass. ; *Kolong-asing*, Miri and Abor ; *Deijir* or *Dengjir-arong*, Mik., *Misai-athep*, *Sinsri-kanthou*, *Chinjai-mailo-phang*, Kach., *Dem-dem-ali*, Kuki ; *Ling-kun*, Lushai.

A very handsome shrub or small tree up to 20 ft. in height ; bark corky outside, very thin ; fragrant, compact and granular within, branches greenish grey, striate, young parts puberulous. *Leaves* 3-9 foliolate ; rachis 1.5-4 in. long, finely channelled, glabrous or slightly puberulous above. *Leaflets* 1-4 by .5-1.8 in.,

obliquely rhomboid or elliptic lanceolate, bluntly acuminate with notched tip or acute entire, thinly coriaceous, dark-green and shining above, totally glabrous when mature; base broadly cuneate; petiolule 1 in. long. *Flowers* 1 in. long, milky-white, sweet-scented, in terminal or axillary few-flowered puberulous corymbs, sometimes solitary when axillary. *Sepals* minute, acute pubescent, dotted. *Petals* oblong-lanceolate. *Ovary* linear, 2-celled. *Berries* 5-7 in. long, 2-seeded, narrowed at both ends, rugose, dotted, red or deep orange when ripe.

Not uncommon in shady ravines throughout ASSAM extending to low hills. Often cultivated as an ornamental plant.

Wood light-yellow, close grained and hard, capable of being used as a substitute for box wood for engraving purposes; weight 62 lbs. per c. ft. The branches make very good handles for implements, also walking sticks, while the twigs are much used for cleaning teeth. The Mikirs distill a thick gum by burning green wood, which their women use to blacken their teeth.

Flrs. 3-5. Fr. 12-1.

2. *Murraya Koenigii* Spreng. Vern. *Narasingha*, *Bishahari*, Ass.; *Nor-hing*, Ass. (Kam.); *Thengsakso*, Mik., *Sam-khatsi*, Garo.

A deciduous shrub with a strong smell; bark thin, dark-brown or almost black outside, blaze greenish-white; young parts downy. *Leaves* 6-12 in. long; rachis terete, pubescent; leaflets 11-35, 1-2 in. long, ovate or lanceolate, oblique at the base, obtusely acuminate or retuse, subentire or irregularly crenulate; glabrescent except along the midrib on either surface; petiolule 1 in. long, puberulous. *Flowers* white, 3-5 in. long, white, in terminal corymbose panicles. *Sepals* small, acute. *Petals* oblong, dotted. *Ovary* 2-celled. *Fruit* 3 in. across, subglobose, rugose, black when ripe. *Seeds* 2, imbedded in mucilage.

Recorded from all Districts except LAKHIMPUR, ascending to 3000 ft. in KHASI HILLS. It has often a gregarious tendency.

It very closely resembles *Clausena excavata* so as to share the same vernacular names and to be applied to the same uses with it. The leaves are much used for flavouring curries in the Madras Presidency and probably also by the Mikirs.

Flrs. 2-3. Fr. 4-5.

9. MICROMELUM Bl.

***Micromelum pubescens* Bl.** Vern. *Sagladi*, *Bon-jamir*, Ass. (Sib); *Hilaguti-gach*, Ass. (Darr.); *Gobor-huti*, *Bhaura*, *Bhaluk-dat*, *Padragota*, *Gobor-hura*, Ass. (Kam.); *Koroiphula*, Syl.; *Thenghanse*, Mik., *Galing-asing*, Abor., *Silkhoh*, *Marsusepel*, Garo., *San-mani*, Mech., *Dieng-tyrpei*, Synt.; *Dieng-soh-tlai-shree*, Synt., (Raliang); *Dieng-syrngam*, Khasi (Shella); *Dieng-soh-rang-soi*, *Dieng-soh-sat*, Khasi, (Nongkla), *Dieng ja-iao*, Kh.

A handsome small evergreen tree, 15-30 ft. in height; young parts pubescent; bark yellowish-grey, somewhat rough outside, thin; yellowish inside. *Leaves* 9-20 in. long, rachis terete, pubescent; leaflets 7-15, generally alternate, occasionally sub-

opposite, 2-6 by 1·25-2·5 in., obliquely ovate-lanceolate, wavy or obscurely crenulate at the margins, thinly coriaceous, glabrous above, tomentose or pubescent beneath along the nerves, closely gland dotted; main lateral nerves 8-10 on either side of the midrib; base cuneate, petiolule 1·15 in. long. *Flowers* dull white, strongly scented, 3·5 in. across, in spreading terminal corymbose-ly decompound panicles of tomentose cymes; pedicels 1·3 in long, minutely bracteate, up to 6·5 in. long; buds oblong; calyx truncate or with triangular lobes; petals 5, valvate, narrow-oblong, pubescent; stamens 10, alternately long and short; ovary usually 5-celled, villous along lines running lengthwise, shortly stipitate; style deciduous, articulate with the ovary; stigma capitate; ovules 2, superposed in each cell. *Fruit* a dry berry, 2·3 in. long, oblong, orange-yellow when ripe, usually 1-seeded. *Cotyledons* green, leaf-like, crumpled.

Fairly common throughout ASSAM, ascending to 4000 ft. in KHASI HILLS.

Flrs. 12-2. Fr. 3-4.

10. LUVUNGA Hamilt.

Luvunga scandens Ham. Vern. *Long-phul*, Ass., *Lavanga-lata*, Beng., Sans. *Luvungalata*.

A powerful scandent evergreen shrub, generally tufted from the ground with strong axillary sharp straight or slightly recurved spines. *Bark* ash-coloured, somewhat rough, about 1 in. thick; cream-coloured inside. *Leaves* alternate, simple on young shoots, afterwards digitately 3-foliate; petiole 6·3 in. long, finely channelled above, glabrous. *Leaflets* 4-9 by 1·2-2 in., oblong-lanceolate, narrowed at both ends, quite entire, firmly coriaceous, dark-green, quite glabrous, minutely punctate both above and beneath; lateral nerves about 15 on either side, arched, very slender, scarcely visible in green leaves; petiolules 2·3 in. long, margined. *Flowers* white, fragrant, about 1 in. diam., in axillary branched racemes with cymose branches, sometimes from old wood, shorter than the petioles; pedicels about 3 in. *Calyx* cup-shaped, about 15 in. long, minutely 4-6 toothed. *Petals* 4-5, 4·5 in. long, linear-oblong, fleshy, recurved. *Filaments* 8-10, glabrous, united below; anthers linear. *Disk* fleshy, annular. *Ovary* 3-celled with 2 superposed axile ovules in each cell. *Fruit* an oblong berry, about 8 in. long, obscurely 3-lobed, 1-3 seeded, with an aromatic pulp. *Seeds* ovoid, pointed; radicle superior; cotyledons green, fleshy; albumen 0.

Only found in the Nambor Reserve by Mr. Mann (who has described it as a tree 4ft. in girth) and on the Sadasew hillock and Nigheriting, DISTRICT SIBSAGAR, by my collector Babu Ramesh Chandra Purkayastha.

A very ornamental plant worthy of a place in gardens.

Flrs. 2-4. Fr. 3-9.

11. ATALANTIA Correa.

Atalantia monophylla Correa. Vern. *Ching-kamla*, *Bankamla*, Manip., *Ramser*, Lushai.

A small tree or large shrub ; stems greenish-brown outside, pale greenish-yellow inside, branches rigid, older armed with sharp axillary spines ; branchlets puberulous. *Leaves* 1-foliolate ; leaflets 2·5-4·5 by 7-17 in., lanceolate or elliptic-ovate-lanceolate, bluntly acuminate, emarginate at the tip, entire, coriaceous, glabrous ; lateral nerves 10-12 on either half with many intermediates between, looping near the margin, ends forming a very wavy more or less continuous nerve ; base cuneate ; petiole 1-3 in., channelled with two subulate stipular scales at the base. *Flowers* white, in puberulous fascicles or contracted corymbose cymes in leaf axil ; pedicels 15-4 in. long ; bracts minute. *Calyx* irregularly split at the base at the time of flowering or after it to the base, lobes very short, ciliate. *Petals* 4 in. long, obovate-oblong, adnate to the staminal tube. *Stamens* 8 ; filaments united almost through their entire length into an irregularly cleft tube ; anthers small, elliptic ; disk inconspicuous, short. *Ovary* tapering to the style ; 3-5 celled ; style long, cylindrical ; ovules 1 or 2, collateral. *Berry* globose like a lime, rugose and glandular outside, 6 by 5 in., 4-celled ; cells 1-seeded.

N. CACHAR HILLS, Borail Res. ; CACHAR, Rukni Inner line reserve ; Barak Inner line reserve ; Mynadher ; KHASI HILLS at the foot bordering SYLHET-Thienpyryngam.

Wood yellowish, hard.

Fr. 5.

The apex of the leaves is described as "obtuse" by several authorities but this does not apply to any of the Assam specimens examined by me.

Atalantia caudata Hk. f. Unarmed shrub. *Leaflets* 3-7 in., very variable, linear lanceolate to elliptic, obtuse, or obtusely acuminate, emarginate at the tip, glabrous, subcoriaceous, entire ; base with a pair of slender sub-basal nerves ; Petiole channelled, 7-8 in. long. *Flowers* 2-3 in. across, white, fragrant, in very short glabrous racemes with slender pedicels. *Calyx* very small, sub-regularly 4-5 lobed ; petals obovate-oblong ; stamens free ; disk narrower than the ovary. *Ovary* 2-celled ovules 2-collateral. *Fruit* globose, 5-8 in. across.

ASSAM—Masters (!) ; CACHAR (Jirighat), Prazer (!) ; KHASI HILLS—Cherra-Hooker.

Flrs. 3-5. Fr. 11-12.

Atalantia ? sp.—A small tree about 25 ft. in height and 2 ft. in girth, bark greyish-white, warty and also with lines of fine lenticels, thick, blaze reddish with green edges ; young parts puberulous. *Leaflets* 5-6·5 by 1·3-2 in., obovate or obovate-oblong, acuminate, subcoriaceous glabrous, lateral nerves 20-24, ends looping near the margin, gland dots close ; base gradually narrowed ; petiolule indistinctly jointed, channelled, puberulous or glabrate. Flrs. and fr. not seen.

Incomplete specimens from Dirju, LAKHIMPUR (Sheet 4388). Further material needed for correct determination.

12. PARAMIGNYA Wight.

Scandent or erect shrubs, armed with axillary spines or unarmed. *Leaves* 1-foliolate, entire, subcoriaceous. *Flowers* rather

large, axillary, solitary or fascicled. *Calyx* teeth 4-5, small. *Petals* 4-5, free, imbricate, rarely valvate. *Disk* thin, columnar. *Stamens* 8-10, free, filaments inserted round the disk, usually hairy, anthers linear-oblong. *Ovary* 3-5 celled; style elongate, deciduous; stigma capitate; ovules in each cell 1 or 2, obliquely superposed. *Fruit* an ovoid or subglobose berry, 1-5 seeded, rind thick; seeds large, oblong, compressed; testa membranous, cotyledons fleshy, equal.

I. *Calyx* not cupular; teeth acute:—

Flowers less than .7 in. across:—

Leaves pubescent along the midrib above, tomentose beneath. Flowers over .5 in.

across. Berry rounded, not pointed at apex. .. 1. *P. Griffithii*.

Leaves glabrous, except along the midrib beneath. Flower .3 in. across. Berry obtusely 5-angled, pointed. .. 2. *P. citrifolia*.

II. *Calyx* cupular; teeth obscure, rounded if present.

Berry small. .. 3. *P. monophylla*.

1. *Paramignya Griffithii* Hook. f. Vern. *Bonjora*, Ass.; *Ingsuthesolo-rikang*, Mik.; *Thaisa-gulangi*, *Thai-saiya-suggur-biding-doukha*, Kach.; *Soh-nari-khlaw*, Khasi.

An evergreen scandent shrub with strong axillary recurved spines; young parts tomentose. *Bark* grey-corky and vertically fissured on old stems, yellow inside. *Leaflets* 2.5-5 by 1-2 in., oblong or elliptic, bluntly acuminate, entire or nearly so, rounded or sub-cordate at the base, thinly coriaceous, glabrous above except along the midrib, softly tomentose beneath at least when young, afterwards sometimes glabrescent; translucent dots numerous; main lateral nerves 10-12 on either side of the midrib; petiolule indistinctly jointed with the petiole, both together .2-.3 in. long, generally twisted, pubescent. *Flowers* white, .5-.6 in. long, solitary or a few together in short axillary cymes; pedicels hairy, jointed near the base up to .15 in. long. *Calyx* hairy outside, with 5 deltoid teeth. *Petals* 5, .4-.5 in. long, lanceolate, imbricate, glabrous. *Stamens* generally 10, nearly as long as the petals; filaments tapering, shaggy except near the thin upper extremity; anthers scarcely .1 in. long, oblong. *Ovary* 5-celled, hairy; style .4 in. long, hairy only at the base. *Fruit* .8-1.2 in. diam., globose or slightly ovoid, terete, glabrous, rugose and usually dark-green; pulp aromatic, very acid.

Gaurisagar, Kujibali, Mahmora, Akhoiphutia, Rengma Res., etc., in SIBSAGAR, generally in shady marshy localities; ravines in the MIKIR HILLS; KAMRUP, Garuchara forest; GOALPARA; N. C. HILLS, KHASI & JAINTIA HILLS up to about 3000 ft., Barpani.

Flrs. 3-4. Fr. 9-1.

2. *Paramignya citrifolia* Hk. f. Vern. *Mei-soh-khar-khlaw*, Kh.

An armed shrub with grey stem; spines recurved .3-1 in. long, base greenish, tip polished; twigs greenish grey; young shoots puberulous. *Leaflet* 3-6 by 1.3-2.6 in., faintly unpleasantly scented, elliptic-ovate or oblong, bluntly acuminate, entire, slightly

glabrous on both surfaces except along the midrib beneath, coriaceous with numerous translucent glands which appear as raised dots on the undersurface ; lateral nerves rather obscure, 10-12 on either half, forming loops near the margin, with many intermediates of nearly equal thickness ; base rounded or obtusely narrowed ; petiolules somewhat obscurely articulated to the petiole, both twisted pubescent and together up to .4 in. long. *Flowers* axillary, about .3 in. across, white ; peduncle about .25 in., jointed near the base, pubescent ; bracts minute, inserted at or below the joint. *Calyx* pubescent with 5, triangular acute teeth. *Petals* 5, oblong, smooth. *Filaments* 10. *Fruit* about 1 by .8 in., ovoid and of the colour of a lemon and with a similar rind, obtusely 5-angled, pointed about 1 by .8 in. ; seeds 3-5, large.

KHASI HILLS on the foot hills above SYLHET ascending to about 2000 ft. —Nongkla, Thleusyrungam, Sutynga, Raliang,

Flrs. hot season. Fr. 12.

The description of the floral organs have been taken from Roxburgh's *Flora Indica*.

3. *Paramignya monophylla* Weight.

A scandent shrub ; younger branches terete, pubescent or glabrous, green. *Leaflet* 2.5-5 in., ovate-lanceolate, elliptic or somewhat obovate, bluntly acuminate, both surfaces nearly alike, undersurface dotted ; petiolule obscurely jointed to petiole, both twisted and .5-.75 in. long. *Flowers* axillary .1 in. across, white, drooping ; pedicels curved .2 in. long, puberulous, jointed, with 2 or 3 subulate bracts inserted at or below the joint. *Calyx* cup-shaped, obscurely toothed. *Petals* 5, linear-spathulate, .5-.6 in. by .2 in., broad at base, spreading, erect, imbricate with green pellucid dots. *Stamens* 10, free ; filaments thick, hairy inside, .4 in. long, curved backwards at the apex. *Ovary* 3-celled. *Berry* ovoid, size of a nutmeg, "very much like a lime"—Roxburgh. *Seed* 1 in each cell.

KHASI HILLS—Hooker. There are no specimens at Calcutta from our area.

Flrs. 4. Fr. 8 (Darjeeling).

13. CITRUS Linn.

Trees or shrubs usually with sharp axillary spines. *Leaves* alternate, 1-foliate, coriaceous, pellucid, punctate, aromatic ; petiole often winged. *Flowers* fairly large, axillary, white or pinkish, sweet scented, solitary or in small cymes or racemes, sometimes 1-sexual. *Calyx* cup-shaped, 3-5 toothed. *Petals* 4-5, rarely more, fleshy, gland-dotted, imbricate in bud. *Disk* fleshy, annular or cup-shaped. *Stamens* 20-60 ; filaments flattened at the base, usually united into several bundles. *Ovary* many-celled ; style stout, deciduous ; ovules in 2 series in each cell. *Berry* globose or oblong, fleshy, rind leathery, many celled with membranous septa, filled with transverse fusiform vesicles containing acid or sweet juice. *Seeds* few in each cell ; testa

leathery ; embryo sometimes two or more in each seed ; albumen 0 ; radicle superior.

- I. Petiole not or narrowly winged ; leaves glabrous :-
 Flowers tinged with red, often 1-sexual. .. 1. *C. medica*.
 Flowers pure-white, always 2-sexual. .. 2. *C. Aurantium*.
- II. Petiole broadly winged. Flowers generally white :-
 Leaves glabrous. Vesicles colourless coherent. .. 3. *C. Hystrix*.
 Leaves pubescent beneath. Vesicles pinkish or pale yellowish. Fruit 4-8 in. in diam. .. 4. *C. decumana*.

The above classification has been drawn up for separating the well marked forms that are commonly found in our area. Dr. Bonavia who devoted several years to the study of limes, citrus and oranges of India has shown (*Cultivated oranges and lemons of India and Ceylon*) that such definite lines cannot be drawn between the races now cultivated. The pumelo approaches in many respects *C. Hystrix*, while the limes come near to the some of the forms of the true orange. Dr. Bonavia also maintains that all true limes have been derived from *C. Hystrix* (Journ. Linn. Soc. XXII-23). He also hazards the opinion that *C. decumana* may have developed from the Malta or Portugal orange or derived from a common ancestor both having red vesicles. It seems probable therefore that *C. Hystrix* is the ancestral forms of all limes and oranges of which the wild forms now found in several parts of India are local manifestations.

1. *Citrus medica* Linn. Vern. *Bakol-khowa-tenga, Jora-tenga*, Ass. ; *Tume-han-thor*, Mik. ; *Naya-changney*, Duff. ; *Haijange*, Manip. ; *Missar*, Tipp. ; *Shashni-jamir*, Sylhet ; *Soh-manong*, Khasi ; *Dieng-soh-sarman*, Synt.

A bushy shrub ; young shoots glabrous, somewhat angled ; spines ascending, straight, 2-1 in. long. *Bark*: greenish, on old stems with close shallow vertical fissures, greenish white. *Leaflets* light green, 3-6 by 2-2.5 in., elliptic-ovate or oblong, oblong-lanceolate or obovate rounded or with an obtuse apex, narrowed or cuneate at the base, crenulate-serrate, with translucent dots at the sinuses, chartaceous, aromatic, covered with translucent dots ; main lateral nerves 10-12 on either side of the midrib, slender, irregular ; petiole 25-4 in. long, naked or very narrowly winged. *Flowers* waxy-white, usually tinged with red, sweet-scented, solitary or up to 10 in a raceme, nearly 1 in. long ; pedicels up to 2 in. long, often 1-sexual ; buds oblanceolate. *Calyx* obconic, truncate or very shallowly toothed. *Petals* linear—oblanceolate, gland-dotted. *Stamens* 20-40 ; filaments reddish, pubescent. *Fruit* 3-5 by 2-3 in., obovoid-oblong, often mamillate at the apex, yellow when ripe, very aromatic, with the thick spongy rind and coherent colourless small vesicles filled with acid aromatic juice.

Common along edges of marshes and sluggish streams throughout ASSAM, ascending about 4200 ft. in KHASI HILLS,

The acid juice of the fruit as also its sweetish inner rind is eaten. Of the other cultivated varieties some forms of *Var. acida*, the acid lime of India are commonly cultivated, the other varieties being practically unknown. The wood is white and fine-grained suitable for agricultural implements when of sufficient size. The branches make good walking-sticks.

Flrs. throughout the year but chiefly 3-5. Fr. 10-2.

2. *Citrus Aurantium* Linn. Vern. *Humutia-tenga*, Ass., *Rebo-singking*, Abor; *Generu-ay*, Miri. The orange.

A small tree with darker and denser foliage than the preceding species, smaller and narrower leaflets and smaller and weaker spines; petiolar wing generally very narrow or 0. *Flowers* white, much smaller than of *C. medica*. *Fruit* depressed-globose, oblate, never mamillate, bright-orange; pulp whitish, unpleasantly acid.

Near Pillung in the E. FRONTIER DISTRICT.

This plant is probably the true wild orange. It should be further studied in the field.

Flrs. 12.

Excellent oranges are grown in the neighbourhood of Shella in KHASI HILLS, KAMRUP, Margherita and Jeypur in LAKHIMPUR and near Mariani in SIBSAGAR. In the cultivated fruit when ripe the vesicles of the pulp is of a dun orange colour, never white.

The race known as Santara orange, and only to a limited extent in the KHASI HILLS, the Mandarin oranges are cultivated.

3. *Citrus Hystrix* DC. Vern. *Hampur-arong*, Milk., *Chamar-baphang*, Cach., *Satkora*, Sylhet; *Soh-Kyniet*, *Soh-kymphor*, Khasi; *Diengsoh-bah*, Synt.

A tree up to 50 ft., or more in height and 3 ft. in girth; stem sometimes fluted at the base; branchlets compressed and angled; spines ascending, small. *Bark* grey or black, very thin, hard, granular, pale-brown inside with white vertical lines. *Leaflets* 1·3-3·5 by ·7-2 in., ovate elliptic or lanceolate on petioles which are winged so as to be equal to or even larger than the leaflets in size and generally obcordately obovate or oblanceolate in shape, retuse at the apex, entire or minutely crenulate, coriaceous, dark-green, glabrous, punctate with oily gland-dots; lateral nerves close and irregular; portion of petiole below the wings 2-3 in. long, channelled or margined. *Flowers* white or light purplish, 6-8 in. diam., axillary, solitary or in few-flowered short cymes; pedicels up to about 2 in. long, buds obovoid. *Calyx* small with 4-5 deltoid teeth. *Petals* 4, obovate or oblanceolate, 3-4 in. long. *Stamens* 20-25; filaments free, stout, glabrous. *Ovary* globose, glabrous; style 2 in. long, stout; stigma large, globose. *Fruit* 1·5-2 in. diam., 15-20 celled; rugose outside with large oil glands; vesicles of pulp small, coherent, colourless; juice very acid.

Fairly common in the MIKIR HILLS chiefly on their eastern and southern slopes down to the foot; Garampani, Dhansiri, etc., also in KHASI HILLS where it is sometimes gregarious (e.g. Marrung); NOWGONG (Lamsakhang), N. C. HILLS.

In cultivation the fruits are usually large and resemble a small pumelo. Sometimes cultivated in gardens.

Wood of cream-colour, hard, very tough, fine and even grained weighing 71 lbs. per c. ft. Medullary rays numerous, very fine, straight; pores of moderate size, scanty, irregularly scattered, solitary or in radial groups; annual rings indistinct but there are numerous fine concentric lines which do not represent annual growth. Well worth a trial as a substitute for box wood.

Flrs. 3-4. Fr. 9-11.

Probably the same as *C. ichangueusis* Swingle, which is also said to occur in the Khasi Hills. The older name has been therefore retained for the present.

4. *Citrus decumana* Linn. Vern. *Rebab-tenga* Ass., *Batavi-nebu*, Beng., The Pumelo or Shaddock.

This wellknown fruit tree is cultivated in homestead compounds in the villages and towns of UPPER ASSAM. Young parts pubescent. *Bark* thin, greyish or greenish brown. *Leaflets* 2-6 by 1-2.5 in., oblong or ovate-oblong, crenate, shining above, pubescent at least along the midrib beneath; petiole broadly winged, obovate or oblanceolate in shape. *Flowers* white, sweet-scented; stamens 15-25; style short; stigma capitate. *Fruit* 6-8 in. diam., globose or broadly pyriform, yellow when ripe; vesicles of pulp large, loose, filled with sweet or acid juice; rind thick, spongy, white inside.

The wood is similar to that of the preceding species, but much lighter.

14. ÆGLE Corr.

Ægle Marmelos Correa. Vern. *Bilwa*, Sans., *Bel*, Ass. & Beng.; *Sherbili-phang*, Cach; *Belethi*, Garo., *Soh-Bel*, Khasi. The Bael tree.

This well-known spinous aromatic tree is not indigenous in UPPER ASSAM except along its western boundary, but is cultivated almost everywhere near Hindu Temples. Its characters are so well known that no detailed description is necessary. The spines are straight and axillary up to about an inch in length. The leaves are normally 3-foliolate, but occasionally some are found digitately 5-foliolate. *Flowers* greenish-white, sweet-scented about 1 in. diam., in few-flowered short lateral panicles. *Petals* 4-5, imbricate, fleshy, gland-dotted. *Stamens* up to 50 or more. *Fruit* 2-7 in. diam., 10-15 celled, with a strong clear mucus imbedded in a mass of sweet aromatic mealy pulp.

Wood even and close grained, tough and strong, but liable to split in seasoning; weight 50-60 lbs. per c. ft. The pulp of the ripe fruit is a laxative and mixed with a little milk and sugar makes a very cooling *sherbet*. The unripe fruit either boiled or roasted is used as a specific for diarrhœa and dysentery. The pulp is also used in Bengal and Upper India to strengthen mortar. The mucus of the cells is used for adhesive purposes and is often mixed with water-paints to add to their strength and brilliancy. *Snuff-boxes* are made of the shell of fruits of small size. The leaves are very bitter and are used as a febrifuge; they are also lopped for cattle-fodder. They are considered indispensable for Hindu worship, especially of the God *Siva* and the wood is one of the few prescribed by the Hindu scriptures for sacred fires.

About 150 seeds weigh 1 oz.

Flrs. 3-5. Fruit ripens 3-6, next year.

31. SIMARUBACEÆ.

Trees or shrubs with bitter bark. *Leaves* alternate, unequally pinnate (in the genera found in Assam), usually exstipulate. *Flowers* in axillary paniced cymes, small, regular, generally unisexual. *Calyx* 3-5 lobed, valvate or imbricate. *Petals* 3-5, rarely 0. *Disk* entire or lobed, rarely 0. *Stamens* as many or twice as many as the petals, hypogynous, inserted at the base of the disk; filaments free, often with a scale at the base. *Ovary* 1-6 celled, usually deeply lobed or with distinct carpels; ovules solitary in each cell. *Fruit* drupaceous or samaroid, rarely baccate or capsular, usually carpels more or less distinct. *Seeds* usually albuminous.

Fruit winged. Stamens in flowers twice as many as petals. Large trees. ..
Fruit not winged. Stamens in flowers as many as petals. Small or middle-sized trees :—

.. 1. *Ailanthus*.

Drupe supported by persistent calyx and petals.

.. 2. *Picrasma*.

Calyx and petals deciduous ..

.. 3. *Brucea*.

1. *AILANTHUS* Desf.

Ailanthus grandis Prain. Indian Forester Vol. XXVIII-P. 131-34, Vern. *Borpat*, Ass. (N. E. Fr.); *Saragphula*, Ass. (N. Lakh.), *Borkeseru*, Ass. (Lakh.); *Koronga*, Ass. (Darr); *Ring*, Ass.; *Sileng-asing*, Miri & Abor; *Diang-ehao*, Khasi; *Lalang-baiong*, Jaintia.

A lofty tree up to 150 ft. in girth with a cylindrical bole. *Bark* grey outside, nearly smooth excepting for deep horizontal wrinkles, 1-1.5 in. thick; inside yellowish-brown, mottled with white specks and traversed by coarse strands of amber-brown. *Leaves* alternate, 2-3.5 ft. long; leaflets alternate, 6-8 by 2.5-4 in., oblique ovate lanceolate, shortly acuminate, entire or sinuate, chartaceous, glabrous; lateral nerves 10-12 on either half, 1 or 2 pairs with glands; base obliquely cuneate; petiolules .3-.6 in. long. *Panicles* axillary, about a foot long. *Flowers* not seen; pedicels in fruit about 1.2 in. long. *Fruit* of 1-3 samaras with wings both above and below the seed, 4-5 by 1.2-1.5 in. including the glabrous finely nerved wings which are perfectly flat, apex rounded, obtuse, the inner margin of the lower end of the wing thickened by the funicular cord of the seed which is near the middle of the samaras, outer edge of base subtruncate; seed flat, .6 in. across; testa membranous, light-brown; cotyledons oily.

Khairan, Bomjur. N. E. FRONTIER; Rangagora, Digboi, Jaipur LAKHIMPUR; Barpathar, Merapani—SIBSAGAR, Lambabak, Barak, CACHAR; LUSHAI HILLS, GARO HILLS, N. CACHAR HILLS, KHASI & JAINTIA HILLS—Nongkha.

Wood light, white, soft, but can be used for tea-boxes and other packing cases.

Flrs. 9-9 ? Fr. 12-1.

2. PICRASMA Bl.

Trees ; every part very bitter. *Leaves* large, imparipinnate. *Flowers* small, unisexual or polygamous, in axillary corymbose panicles. *Calyx* very small, 4-5 toothed. *Petals* 4-5, valvate, very often enlarging after flowering. *Disk* thin, entire. *Stamens* 4-5 ; filaments hairy, not scaly. *Carpels* 3-5 ; styles free at the base and apex but united in the middle ; ovules erect, solitary. *Fruit* of 1-5 fleshy or coriaceous drupes supported by the persistent calyx and petals. *Seeds* erect, albuminous.

Leaflets 9-15, serrate.
Leaflets 3-7, entire

..
..

.. 1. *P. quassioides*.
.. 2. *P. javanica*.

1. **Picrasma quassioides** Bennet. Vern. *Dieng-khlang*, Khasi.

A small tree ; young parts brown, tomentose ; twigs dotted with circular lenticels ; bark perhaps more bitter than that of *P. javanica*—dark grey to black, fairly smooth or slightly rough outside, dull-white inside. *Leaves* lyrate imparipinnate ; rachis 3·5-6·5 in. long, puberulous ; leaflets 9-15, lowest pair smallest, penultimate pair largest, opposite or subopposite, 1·5-4 by ·5-1·6 in., ovate to lanceolate, long acuminate, serrate, membranous, glabrate with age ; lateral nerves 7-9 on either half, prominent beneath, nervules finely reticulate ; base often oblique ; petiolules of lateral leaflets very short up to ·08 in., of the terminal leaflet ·5-1 in. long. *Flowers* green, ·2-·3 in. across in axillary corymbose puberulous panicles up to 6 in. long 5(-4) merous ; pedicels ·2-·4 in. long, jointed below the middle. *Calyx* lobes small, imbricate. *Petals* ovate or oblong-obovate ; filaments with thick hairy bases. *Drupels* ·25-·3 in. long, 1-5 together, obovoid or globose, black when ripe, supported by the much enlarged coriaceous petals and calyx.

KHASI HILLS above 3000 ft.
Flrs. 4-6. Fr. 7-9.

2. **Picrasma javanica** Bl. Vern. *Putisal* or *Putichhal-asing*, Miri ; *Singka-asing*, Miri and Abor ; *Nimtita*, Ass. (Lakh.) ; *Bon-poshla*, Ass. (Sib.) ; *Putichhal*, Ass. (N. E. F.) ; *Aeo*, Naga ; *Sheng-lokso*, Mik. ; *Bor-jagrenq*, Garo ; *Teju*, Nep.

A middle-sized tree ; bark thin, dark-brown or black and more or less smooth outside, dun-brown and reticulated underneath the cuticle, white inside, very bitter ; young parts pubescent. *Rachis* 3·5-8 in. long, glabrous. *Leaflets* 3-7 but generally 7·2·5 by 1-2 in., oblong ovate, elliptic or obovate-oblong, abruptly and somewhat bluntly tailed ; quite entire, thinly coriaceous, dark-green, glabrous ; main lateral nerves 5-7 on either half, much arched ; base cuneate, sometimes oblique ; petiolule ·1-·15 in. long, channelled. *Panicles* peduncled, corymbose, axillary, 2-4·5 in. long ; branches slightly pubescent. *Flowers* polygamous, dull-white, about ·3 in. across ; pedicels at first villous, elongating in fruit and then ·3-·5 in. long. *Calyx* small, 4-toothed,

obes ciliolate. *Petals* 4, about .15 in. long, valvate with slightly conduplicate margins, ovate. *Stamens* 4; filaments short, subulate, hairy. *Carpels* generally 4, alternating with stamens or staminodes with barren anthers. *Drupels* 1-4, subglobose, .3-.5 in. long, black when ripe, shining, seated on the cushion-like disk and supported by the accrescent coriaceous petals and calyx which then attain up to .5 in. in length.

Fairly common in shady parts of evergreen forests, throughout the province, ascending to 2000 ft. in KHASI HILLS.

The bark is very bitter and is used as a febrifuge by Miris and Abors, also by the Nepalese.

Wood light, white and soft, weighing 27 lbs. per c. ft.

Flrs. 4-5. Fr. 10-11.

P. Nepalensis Benn. Vern. *Thigisin*, Garo-has been united with the above by Sir George King (Journal Asiatic Soc. Vol) a view with which I entirely agree, as I cannot find any constant character by means of which the two could be separated. It is a small tree, which in all characters closely resembles forms of *P. javanica* with narrow leaflets and slender panicles. The fruit is reported to be edible when ripe by local officers, a statement about which I have serious doubts.

GARO HILLS—planted near villages.

Fls. 3. Fr. 4?

3. BRUCEA Mill.

Brucea mollis Wall Cat. Vern. *Dieng-la-kasein khlow*, Synt.

A small shrub; branches speckled with close set lenticels; stems reddish-brown, elegantly marked with reticulate lines; young parts tomentose. *Leaves* alternate, imparipinnate; rachis pubescent, 7-14.5 in. long; leaflets 7-13, lateral opposite, lowest pair smallest, larger upwards, 2-5 by .7-1.7 in., ovate or oblong-lanceolate, acuminate, entire, membranous, pubescent on both surfaces, more densely beneath; lateral nerves 8-11 on either half, arcuate; base often unequal, rounded or cuneate. *Flowers* green, minute, polygamous, in small cymes arranged in axillary pubescent racemes 4-9 in. long; pedicels short. *Calyx* minute, 4-partite; lobes imbricate. *Petals* 4, minute, imbricate, linear, longer than the stamens. *Disk* 4-lobed: stamens 4, inserted beneath the disk; filaments naked. *Ovary* deeply 4-lobed, glabrescent; styles deflexed. *Fruit* of 1-2, less often 3 or 4 drupels, .4-.5 by .3 in., orange red when ripe, somewhat fleshy, ovoid, pointed at the apex; stone reticulated; seed exalbuminous; cotyledons fleshy.

KHASI AND JAINTIA HILLS above 3000 ft., KAMRUP-bet. Agrang and Doimari.

Fr. 1.

B. sumatrana Roxb.—A large evergreen shrub, often epiphytic; branchlets stout, tomentose, as are also leaves and inflorescence. *Leaves* 12-15 in. long, imparipinnate; rachis terete; leaflets 9 or 13, 2.5-4 by 1-1.4 in., ovate-lanceolate, coarsely serrate, green above, pale or tawny beneath; base acute; petiolules slender. *Flowers* purplish, small in distant cymes arranged on axillary racemes up to 14 in. long. *Calyx* very small. *Petals* larger than calyx segments. *Drupes* .25 in. long, ovoid, somewhat compressed and ridged, black when ripe, stone reticulate.

ASSAM—Hooker, Brandis. I have however seen no specimens at Calcutta from our area.

Flrs. 3-7. Fr. 4-8.

FAM. 32. OCHNACEÆ.

Glabrous shrubs or trees with watery juice. *Leaves* alternate, usually simple, coriaceous; stipules 2. *Inflorescence* paniced or umbellate; flrs. rarely solitary, bracteate. *Flowers* hermaphrodite, conspicuous, usually yellow or orange; sepals 4-5, free, imbricate, persistent, sometimes coloured in fruit. *Petals* 5, rarely 4 or 10, free, hypogynous, imbricate, longer than the sepals, deciduous. *Disk* enlarged after flowering. *Stamens* various, sometimes indefinite, inserted on the disk; filaments persistent; anthers basifixed, sometimes deciduous, dehiscing longitudinally or opening by terminal pores. *Ovary* short, 2-10 celled, sometimes deeply lobed; placenta axile or parietal; style simple, subulate or free at the extremity; ovules 1-2 in each cell or indefinite, ascending or rarely pendulous; raphe ventral. *Fruit* of several drupels or pyrenes each with 1-4 seeds, or capsular; albumen fleshy or 0.

OCHNA Linn.

Deciduous trees, shrubs or undershrubs. *Leaves* serrate. *Flowers* large yellow in bracteate panicles or umbels. *Sepals* 5, coloured, persistent in fruit; petals 5-12; disk lobed, thick. *Stamens* indefinite, shorter than the petals; anthers generally opening by terminal pores, deciduous. *Ovary* deeply 3-10 lobed, each lobe 1-celled. *Drupels* 3-10, each one seeded, seated on the enlarged disk.

Large shrubs or small trees, shoots perennial; branchlets annulate with scars of bud scales; inflorescence corymbose:—

- | | |
|---|------------------------------|
| Anthers equalling or a little longer than the filaments in the fully opened flower. Petals usually much exceeding the sepals. | ... 1. <i>O. Wallichii</i> . |
| Anthers several times longer than the minute filaments in the fully opened flower. Petals as long as the sepals or a little longer. | ... 2. <i>O. squarrosa</i> . |
| Undershrubs; shoots annual; branchlets not annulate; inflorescence umbellate. | ... 3. <i>O. pumila</i> . |

1. *Ochna Wallichii* Planch? Vern. *Khimdabeng*, Garo.

A small deciduous tree; bark dark-brown outside; blaze dark red striated with fine brown veins, pale-green on the edges; bud scale dry, oblong, parallel-veined, concave, unequal up to about .5 in., scars annulate, prominent. *Leaves* 4-9.5 by 1.3-2.3 in., lanceolate or oblong lanceolate, acute or shortly acuminate, cuspidate serrate, thinly coriaceous; lateral nerves 15-19 on either half, ends meeting near the margin and more or less contiguous, fine; nervules indistinct, straight, mostly subparallel; petiole very short; stipules .15 in. long, subulate, intrapetiolar. *Flowers* before the leaves, in few flowered corymbs, mostly at the ends of short

lateral woody branches ; pedicels .5-1 in. long, jointed near the base. *Sepals* 5, obtuse-oblong, about .5 in. long. *Petals* .6-.9 by .25-.4 in., obovate, clawed. *Filaments* a little shorter than the anthers or equalling them. *Drupels* 3-5 on a large hemispheric disk, reticulate when dry. *Fruiting sepals* reflexed, reddish, purple, coriaceous.

GARO HILLS near Tura, Rongrengiri reserve, Songsak road ;

CACHAR—Katakhal Forests—Mann ! SYLHET, *Brandis*.

Wood is used for rice pounders.

Flrs. when leafless 3-4 ?

2. *Ochna squarrosa* Linn.

A small subdeciduous tree or shrub ; branchlets annulate with scars of fallen bud scales. *Leaves* 2.5-5 by 1-2 in., obovate, elliptic or oblanceolate, acute usually at both ends, firmly coriaceous or subcoriaceous, remotely but sharply serrate ; petiole .15-.2 in. long, stouter than in *O. Wallichii* ; stipules .15-.25 in. *Flowers* while the leaves are still on, fragrant, from ends of short lateral branches or scars of fallen leaves, in corymbose racemes ; pedicels 1-1.5 in. (stouter than in last sp.) long. *Sepals* .5-.7 in. long. *Petals* 5-12, as long as sepals, or a little longer, clawed ; anthers several times longer than the filaments, .3-.4 in. long ; filaments minute ; lobes of disk ridged. *Drupels* .3 in. long. *Fruiting sepals* erect.

KHASI HILLS, SYLHET—Clarke (!) GARO HILLS, Rongrengiri.

Flowers 3-4. Fr. 5-6,

3. *Ochna pumila* Ham.

An undershrub usually with annual shoots from a perennial woody root-stock. *Leaves* 3.5-6 by 1.3-2 in., oblanceolate or obovate, obtuse or subacute at apex, spinous serrulate, coriaceous ; lateral nerves 10-12 on either half, fine, slightly raised, tapering to a short petiole ; stipules .25-.3 in. long, lanceolate, margins toothed. *Flowers* bright yellow, 1.5-2 in. across, fragrant, few together, subumbellate at the ends of long axillary and terminal peduncles, 2-3 in. long ; pedicels .7-1.5 in. long, joined below the middle. *Sepals* up to .5 in. long, elliptic-oblong. *Petals* yellow, delicate, obovate, much exceeding the sepals ; filaments a little shorter than or equalling the anthers ; style with 4 linear segments near the top. *Drupels* up to .5 in. long, greenish when ripe.

LOWER ASSAM—Mann ! ASSAM—Fisher !

Flowers 3-5. Fr. rainy season.

FAM. 33. BURSERACEÆ.

Resinous trees or erect shrubs. *Leaves* alternate, usually imparipinnate in the Genera described here, generally exstipulate. *Flowers* small, 2-sexual or polygamous. *Calyx* free, 3-7 cleft, valvate or imbricate. *Petals* 3-7, usually distinct. *Disk* annular or cup-shaped. *Stamens* as many or twice as many as the petals; filaments usually free, inserted on the margin or outside at the base of the disk; anthers 2-celled. *Ovary* free, 2-5 celled, with 2-axile pendulous ovules in each cell; style simple. *Fruit* a drupe, either with 1-5 pyrenes or with a 1-3 celled and 1-3 seeded stone. *Seeds* exalbuminous.

Calyx lobes 5, stones 1-celled, 1-seeded :—

Flowers terminal or at the ends of branches; disk lining the calyx tube.

.. 1. *Garuga*.

Flowers axillary or from axils of fallen leaves; disk annular.

.. 2. *Bursera*.

Calyx lobes 3; stones 3-celled, usually 1-2 seeded.

.. 3. *Canarium*.

1. GARUGA Roxb.

Middle-sized or large trees; branchlets pubescent when young. *Leaves* exstipulate, crowded towards the ends of branches; leaflets opposite, subsessile. *Flowers* polygamous in much branched panicles. *Calyx* campanulate, 5-fid, valvate, clothed within by the large, but thin, crenate disk. *Petals* 5, inserted on the tube of the calyx, induplicate-valvate. *Stamens* 10, equal, in 2 series, inserted at the mouth of the hollowed disk. *Ovary* sessile, ovoid, 4-5 celled; style erect; stigma capitate. *Fruit* a globose fleshy drupe with 1-5, 1-seeded pyrenes. *Seeds* with a membranous testa; albumen 0; cotyledons contorted.

Leaflets turning red before falling. Panicles usually under 9 in., not slender. Calyx deciduous. Ovary usually tomentose. Drupe .5-1 in. diam.

... 1. *G. Pinnata*.

Leaflets turning yellow before falling. Panicles up to 16 in., slender. Calyx persistent. Ovary usually glabrous or nearly so. Drupe under .2 in. diam.

... 2. *G. Gamblei*.

1. *Garuga pinnata* Roxb. Vern. *Thotmola*, *Rohimola*, *Thotmela*, Ass.; *Kechkechi*, Ass. (Darr.); *Pani-amora*, Ass. (Sib.); *Rohimala*, Ass. (Nowg.); *Tejhi-arong*, *Timur*, Mik.; *Bonkung-asing*, Miri; *Bonthai-phang*, *Roun-poma*, Kach.; *Sibon-asing*, Abor; *Thing-rot*, Kuki; *Chigambol*, *Chidampha*, *Dumi*, *Agri*, *Garó*; *Toisim-taito*, *Bombus*, *Bombuk*, Tipp.; *Sri-amla*, *Pahari-jiga*, *Jharua*; *Engla*, *Hengela*, Sylh.; *Dabdabi*, Nep., *Dieng-khiang*, *Khasi*; *Dieng-soh-pujjar-synrang*, *Dieng-soh-khmud*, *Khasi* (Umling).

Usually a middle-sized deciduous tree. *Bark* grey or brown outside up to 1 in. thick, generally rough and exfoliating in round

hard flakes; blaze red or deep-pink, somewhat aromatic, often with distant streaks of white tissue; young parts and inflorescence pubescent. *Leaves* 9-18 in. long. *Leaflets* 11-19, variable in size, 2-6 by 1-1.7 in., oblong- or ovate-lanceolate, somewhat oblique, caudate-acuminate, turning red before falling, crenate, subcoriaceous, more or less pubescent, especially beneath, often invested with large reddish galls; lateral nerves about 18 on either half, straight, often almost transverse; base oblique; petiolule .1-1.5 in. long or 0. *Flowers* greenish-yellow, .15-.25 in. long, in cymes arranged in large terminal panicles usually up to 9 in. long before or with the leaves; bracts linear, deciduous; pedicels up to .2 in. long, tomentose. *Calyx* campanulate, green; segments triangular or ovate, valvate. *Petals* 5, yellow, linear or oblong, acute, alternating with the calyx-segments and twice as long, tomentose outside. *Filaments* hairy as also are the ovary and style; stigma capitate, 4-5 lobed. *Drupe* irregularly globose, .5-1 in. across; pyrenes 2-3.

Throughout the province, chiefly in deciduous or open forests, ascending to about 2500 ft.

The heartwood is reddish-brown and has a reputation for durability. Weight about 40 lbs. per c. ft. The bark may be used for tanning and the leaves are good fodder for buffaloes. The tree can be grown from cuttings.

Leafless 2-3. Flrs. 3-4. Fr. 5-12.

A form with leaves about 2 ft. or more in length; leaflets attaining 8.2 by 3.5 in. more pubescent than in the type, and inflorescence attaining 20 in. has been collected by Mr. C. Purkayastha from Dibru Reserve, Lakhimpur. This form which has been recorded also from Jalpaiguri (R. C. Sircar!), Sibsagar (Peal!) Tounegoo (C. S. Rogers No. 210!), Kachin Hills (Pottinger!) has not been separated in the Calcutta Herbarium. Further observation is needed for determining its position.

2. *Garuga Gamblei* King (W. W. Smith). Rec. Bot. Surv. Ind. iv. 262. Vern. *Bon-misri*, (also *Bonthai-phang*), Kach.; *Bankung-asing*, Miri; also most of the other names for *G. pinnata*.

A very large tree up to 10 ft. in girth and up to 70 ft. to the lowest branch with a spreading crown, often buttressed at the base. *Bark* ashy-grey and nearly smooth outside except for faint vertical fissures and scattered warts, exfoliating in irregular flakes; inside uniformly reddish-brown or light red in thin concentric layers, fibrous, often with broad streaks of firmer tissue of brown colour, .3-.5 in. thick, not aromatic; young parts puberulous. *Leaves* alternate, generally imparipinnate, 12-18 in. long, exstipulate; rachis pubescent when young, afterwards glabrous. *Leaflets* 13-17, 2-6 by 1-2 in., subsessile or on petiolules up to .1 in. long, ovate-oblong or oblong-lanceolate, caudate acuminate, crenate-serrate, membranous, sparsely pubescent when young, afterwards glabrous, turning yellow before falling; lateral nerves upto 20 on either half, arching; base oblique, the upper half beginning from opposite the second nerve of the lower half. *Panicles* on extremities of leafless branchlets, 8-12 in. long, lengthening in fruit up to about 16 in. with racemose branches and cymose branchlets; rachis pubescent, but ultimately glabrous

towards the base; bracteoles .15-.3 in. long, lower 3-lobed, deciduous. *Flowers* small, about .2 in. across; pedicels up to .1 in. long. *Calyx* glabrous inside, minutely tomentose or puberulous outside; lobes 5, triangular, persistent in fruit. *Petals* 5, ovate, about .1 in. long, glabrous inside. *Stamens* 10, inserted on the margin of the disk; filaments glabrous. *Ovary* 5-celled, glabrous or minutely pubescent; style .15 in. long, stout, glabrous. *Drupe* .15-.2 in. across, generally with 1-2 woody pyrenes.

Sporadic in hilly tracts and in the vicinity of hills up to 3000 ft., e.g., N. E. F. DISTRICT; Charduar Reserve in DARRANG; Sonaikusi reserve—NOWGONG; Dalu, GARO HILLS; Nongpoh, KHASI HILLS.

Leafless 1-4. Flrs. 3-4. Fr. 5-6-12.

The tree has probably the same economic uses as *Garuga pinnata*. Wood grey, with large pores and fine equidistant medullary rays; weight about 40 lbs. per c. ft., heartwood not seen.

2. BURSERA Linn.

Bursera serrata Colebr. *Neoli*, Mech; *Mirtenga*, Ass. (Kam.); *Bil*, Lushai; *Engla* or *Hengla*, Cach; *Thikring*, Garo; *Nihor*, Jharua; *Kisianthor-arong*, *Kichejanthar*, Mik.; *Dieng-soh-mir*, Kh.

A medium sized or large tree. *Bark* brownish or light grey outside exfoliating in irregular flakes, inside pink changing to reddish brown, softly fibrous, about .75 in. thick; young parts pubescent. *Leaves* alternate, imparipinnate; rachis 7-14 in. long, terete, pubescent. *Leaflets* 5-11, opposite, .3-5.5 by 1-.5-2 in., ovate to oblong, sometimes elliptic-lanceolate, somewhat bluntly caudate, almost entire to coarsely serrate, coriaceous, pubescent when young, ultimately glabrous above, thinly pubescent or glabrate beneath; lateral nerves 8-14, prominent beneath, arcuate, upper meeting in loops near the margin; base oblique, narrowed or rounded; petiolules .3-.7 in., usually swollen both at apex and base. *Flowers* small, about .1 in. across, green, hermaphrodite, pentamerous in lax panicles from leaf axils or axils of fallen leaves and shorter than the leaves; pedicels short. *Calyx* small; lobes rounded, pubescent externally. *Petals* valvate in bud, ovate oblong, acute, pubescent outside; stamens 10, nearly equal. *Disk* annular, crenate. *Ovary* hairy surrounded by the disk; stigma sessile or subsessile. *Drupe*s on thick peduncles, .5-.75 in. across, 2-3 furrowed; exocarp bright pink, inside with 1-3 stones in white soft, pleasantly acid, edible pulp.

KAMRUP, CACHAR, NOWGONG, GARO HILLS, LUSHAI HILLS, GOAL-PARA, and KHASI HILLS—at the foot; probably all over the province. Gregarious in some places e.g. Tepaimukh.

Wood hard, sapwood light brown, heartwood red, close grained, "medullary rays fine, making a good silver grain"—Gamble.

It is said to be an excellent wood for furniture. The fruit is eaten. It coppices well.

Flrs. 3-4. Fr. .

3. *CANARIUM* Linn.

Large resinous trees. *Leaves* alternate, imparipinnate, stipulate or exstipulate. *Flowers* bracteate, 2-sexual or polygamous. *Calyx* valvate, cup-shaped or urn-shaped, persistent, 3-lobed. *Petals* 3-5, imbricate or valvate, usually exceeding the calyx, inserted outside the disk. *Stamens* usually 6, free and inserted on the disk, monadelphous and distinct from the disk. *Ovary* usually 3-celled; style short or stigma subsessile; in male flowers reduced to a pistillode. *Drupe* more or less trigonous, containing a single bony 3-celled stone, usually with one seed, rarely with two (one each in two of the cells); testa thin; cotyledons often divided, very oily.

Leaflets entire, thinly coriaceous, glabrous at least when mature.

.. 1. *C. bengalense*.

Leaflets serrulate, thickly coriaceous, ferruginous-tomentose even when fully mature.

.. 2. *C. resiniferum*.

1. *Canarium bengalense* Roxb. Vern. *Komker-asing*, Miri & Abor; *Dhuna* Ass.; *Hjung-arong*, *Inghet-ki-ik-arong*, Mikir; *Gokul*, Nep.; *Borsamphol*, Garo; *Satrai-phang*, Cach.

Generally a middle-sized tree but at times a lofty one up to 12 ft. in. girth. *Bark* exfoliating in thin irregular flakes, 7 in. thick; inside light yellowish-brown to reddish-brown according to age, mottled with streaks of darker brown or pink; extremities of branches rusty pubescent, otherwise glabrous. *Leaves* 1-3 ft. long, more or less crowded at the ends of the branchlets; stipules subulate. *Leaflets* generally 13-15, sometimes up to 21, 3-9 by 1-3 in., opposite or subopposite, ovate-oblong, lanceolate, rather bluntly acuminate, entire, thinly coriaceous, glabrous and shining above, almost with a metallic lustre when dry, thinly pubescent when young but soon glabrescent beneath; lateral nerves generally 10-15, sometimes up to 20, on either half, prominent beneath, tertiaries and quarternaries closely reticulate; base oblique; petiolule 1-15 in. long, terete, stout. *Flowers* in narrow axillary or supra-axillary raceme-like panicles up to 15 in. long, thinly pubescent; buds oblong; pedicels short, about 3 in. long. *Calyx* cup-shaped with three broad teeth, fleshy. *Petals* 3, obovate-oblong. *Disk* 3-lobed, concave, hirsute. *Filaments* connate, half way up. *Drupe* 1-3-1-7 in. long, ellipsoid, pruinose; mesocarp fleshy, aromatic; stone 3-gonous, usually 3-celled, 1-2 seeded.

Fairly common in evergreen forests throughout ASSAM, ascending to 3000 ft., in KHASI HILLS.

The wood is very open-grained and evidently not strong. But it does not warp and seems to be suitable for tea boxes. Weight 39 lbs. per c. ft. A clear amber-like resin exudes from wounds in the bark, which is burnt as an incense.

Flrs. 5-7. Fr. 11-1.

2. *Canarium resiniferum* Brace, King in Journ. As. Soc. Beng. Vol. 62 (1893). Vern. *Silum-pakia*, Abor and Miri; *Dhuna*, Ass.; *Satrai-phang*, Kach.; *Mekruk*, Manip.; *Bero-thing*, Kuki;

Beroh, Lush. and Kuki; *Hijung*, Mikir; *Bero-rata*, Tipp.; *Beri-rata*, Sylh.; *Bot-sasat*, *Dong-kh reng*, Garo.

A gigantic * tree buttressed at the base and with a spherical crown after height growth is completed. *Bark* light-greenish grey outside, exfoliating in long hanging and over-lapping flakes, about .5 in. thick; vivid green underneath the cuticle, inside brown or reddish brown, fibrous, hard but brittle, somewhat aromatic. *Leaves* 1-2 ft. long; rachis sub-sulcate. *Leaflets* 3-13, opposite or subopposite, 3.5-8 by 1.5-4 in., ovate to oblong-lanceolate, sometimes cbovate to oblanceolate or elliptic, somewhat abruptly and obtusely acuminate, finely serrulate or crenulate, tough and coriaceous, glabrous and shining above, ferruginous tomentose or tardily glabrate beneath; lateral nerves 10-24 on either side of the midrib, rather abruptly arched towards the extremity, very prominent beneath; tertiaries transverse and parallel; quaternaries very finely reticulated; base usually rounded, more or less oblique; petiolules .1-.25 in. long. *Panicles* supra-axillary, 12-15 in. long with a peduncle half its length; branches short, cyme bearing, densely ferruginous-tomentose; pedicels short; buds elongate. *Calyx* about .1 in. long, cup-shaped, with 3 shallow and rounded teeth, tomentose outside. *Petals* 3, oblong, .2-.3 in. long, overlapping to the left. *Stamens* connate into a tube half way up, enclosing the very bristly disk. *Drupe* up to 2 by .8 in., almost exactly like that of *C. bengalense* but generally more pointed at both ends.

Not common; on lower hills or on plateaus throughout the province.

The bark exudes a blackish tar-like resin which finds its way in the markets in large round lumps. Bees often gather it before it hardens (for their hives?).

Flrs. 6-7. Fr. cold season.

A closely allied form—*Silampakiak*, Miri—my sheet 3203 collected at Pasighat N. E. Frontier may perhaps be *C. strictum* Roxb. or an intermediate form, but material at my disposal is insufficient for correct determination. It is a lofty tree with bark exfoliating in overlapping plates, and brown blaze with bands of light red; the leaflets are mostly tomentose beneath.

***Balsamodendron Roxburghii*, Arn.** A small resinous tree; branchlets often ending in spines. *Leaves* alternate, 1-3 foliolate; leaflets 1-2.5 by .5-1.2 in., oblanceolate or spatulate, closely serrate with 6-7 fine lateral nerves; base tapering to the petiole which is .2-.8 in. long. *Flowers* and *fruits* not seen.

There is one poor specimen with leaves only in Calcutta herbarium and none from our area.

It is said to occur in SYLHET and ASSAM according to Hooker and should be looked for.

* A tree 150 ft. high, 90 ft. up to the lowest branch and 14 ft. 4 in. girth was measured in December 1913.

FAM. 34. MELIACEÆ.

Trees or erect shrubs. *Leaves* alternate, normally pinnate; leaflets generally oblique at the base; stipules 0. *Flowers* regular, generally 2-sexual, in paniced cymes. *Calyx* small, 3-6 lobed; lobes generally imbricate in bud. *Petals* 3-6, usually free, imbricate. *Stamens* as many, or more frequently twice as many as the petals; filaments generally connate into a tube, rarely free; anthers 2-celled, introrse, erect, usually sessile on the tube, included or excluded. *Disk* surrounding the ovary and often adnate to it, annular or tubular. *Ovary* 3-5 celled; style simple or stigma sessile; ovules generally two in each cell, collateral or superposed, rarely solitary or numerous. *Fruit* a drupe, capsule or berry; seeds often arillate, with or without albumen; radicle superior.

- I. Ovules 1-2 in each cell; seeds not winged :—
 - A. Fruit drupaceous; leaflets generally serrate :—
 - Leaves pinnate. .. 1. *Azadirachta*.
 - Leaves 2-3 pinnate. .. 2. *Melia*.
 - B. Fruit capsular or baccate; leaflets entire or nearly so :—
 - 1. Fruit capsular :—
 - a. Filaments free towards the apex; disk annular. .. 3. *Heynea*.
 - b. Filaments completely united :—
 - i. Staminal tube linear or oblong; style long; petals 4-5; ovary 3-4 celled :—
 - *Trees; petals free; anthers more or less included in the staminal tube :—
 - Flowers bisexual; anthers short; ovules 2 in each cell. .. 4. *Dysoxylum*.
 - Flowers polygamous; anthers long; ovule 1 in each cell. .. 5. *Chisocheton*
 - **Undershrub; petals united about half way; anthers exserted. Flowers bisexual. .. 6. *Munronia*.
 - ii. Staminal tube globose; style 0*; petals 3, ovary 3-celled; anthers included. .. 7. *Amqora*.
 - 2. Fruit a berry :—
 - Anthers 5, included in the more or less globose staminal tube; style 0. .. 8. *Aglala*.
 - Anthers 10, exserted; filaments free or nearly so; style present. .. 9. *Walsura*.
 - II. Ovules many in each cell; seeds winged; fruit capsular :—
 - Filaments connate into a cylindrical tube; disk 0; capsule 3-celled; seeds packed transversely in each cell. .. 10. *Chickrassia*.
 - Filaments free; disk conspicuous; capsule 5-celled; seeds packed lengthwise in each cell. .. 11. *Cedrela*.

* Assam species.

1. AZADIRACHTA A. Juss.

Azadirachta indica A. Juss. Syn. *Melia Azadirachta* Linn., F. B. I. *Melia indica* Brandis For. Flor. Vern. *Nim*, Ass.; Beng. *Nimba*. Sans.

A well known large to middle sized handsome tree, sometimes planted in homesteads and found as escape throughout the plains of Assam. *Leaves* imparipinnate, 9-15 in. long, crowded towards the ends of branches; rachis glabrous. *Leaflets* 9-15, terminal, often aborted, subopposite, 2-4 by 1-5 in., obliquely lanceolate to ovate-lanceolate or falcate, very unequal sided, gradually acuminate, coarsely serrate, glabrous, dark green and shining above; petiolules very short. *Flowers* white, about 4 in. across, scented, in axillary lax, glabrous, panicles, shorter than or as long as the leaves. *Calyx* small, 5-fid, divided almost to the base; segments broad, rounded. *Petals* 5, about 2 in. long, spreading, oblong-spathulate, ciliolate, pubescent inside along the middle; staminal tube dilated at the base and apex, usually pubescent inside near the top, 10-12 toothed. *Anthers* inserted inside the staminal tube, opposite the teeth. *Ovary* flask-shaped, 3-celled; style as long as staminal tube, expanded into the 3-lobed fleshy stigma. *Drupe* 5-7 in. long, ovoid, oblong, 1-celled, 1-seeded, smooth, greenish-yellow, when ripe.

Heartwood dark-red, very hard, weighing about 50 lbs. per c. ft., good for furniture. It makes good sonorous drums. In Assam, however, the tree is chiefly valued for its bark and leaves which are used in medicine. An oil is expressed from the pulp of the fruit, which is valued for its antiseptic properties and considered to be very good for small pox and sores in general.

Flrs. 3-4. Fr. 7-8.

2. MELIA Linn.

Middle-sized or large trees. *Leaves* 2-3 pinnate. *Flowers* in large much-branched axillary panicles. *Calyx* small, 5-6 lobed, imbricate. *Petals* 5-6, free, convolute in bud. *Disk* annular. *Stamens* 10-12, united in a cylindrical tube dilated below and above, striate, toothed at the edge; anthers inserted on or near the mouth of the tube. *Ovary* 3-6 celled with two superposed ovules in each cell; style slender; stigma capitate, deciduous. *Fruit* a dry or fleshy 1-5 celled drupe; seed solitary in each cell, pendulous.

I. Branchlets thin; leaves 2-pinnate; staminal tube slender, purple, glabrous, suddenly expanded at mouth.

.. 1. *M. Azedarach*.

II. Branchlets stout; leaves 2-3 pinnate; staminal tube stout, more or less hairy, not suddenly expanded:—

Leaflets on fairly long slender petiolules; reticulations fine but distinct; staminal tube with 10 bi-fid teeth.

.. 2. *M. composita*.

Leaflets on very short winged petiolules; reticulations indistinct; staminal tube with at least 30 teeth.

.. 3. *M. superba*.

1. **Melia Azedarach** Linn. Vern. *Abari-asing*, Miri and Abor ; *Thai-mado* or *Themdou-phang*, Kach. ; *Nim-tita-arong*, Milk. ; *Bokain*, Hin. ; *Ghora-nim*, Mahanim Beng & Ass. ; *Dieng-jah-rasang*, Khasi.

Usually a small or middle-sized deciduous tree* with a short trunk and large spreading crown ; branchlets slender ; young parts and inflorescence covered with stellate scurfy hairs ; bark greenish brown and smooth but lenticellate on young stems ; dark-grey, exfoliating in rectangular pieces and about 5 in. thick on mature trees ; blaze dark-brown. *Leaves* 10-20 in. long, 2-pinnate, rarely 3-pinnate by a few leaflets of the lowest pinnæ being further subdivided ; pinnæ 5-9. *Leaflets* 3-7 on each pinna, 5-2 by 3-1 in., somewhat obliquely ovate-lanceolate, acuminate, unequally serrate or sometimes lobed, membranous ; petiolules 1-2 in., slightly margined, those of terminal leaflets longest. *Flowers* lilac-blue, up to 4 in. long, in numerous axillary cyme bearing panicles ; peduncles 3-4 in. long, ultimately glabrous ; ramifications slender ; pedicels 0-3 in. long, very slender ; bracts and bracteoles minute. *Calyx* deeply 5-lobed, stellate-tomentose ; lobes elliptic to ovate-oblong. *Petals* 5, 2-3 in. long, linear-oblong or oblanceolate, with a faint midrib, pubescent outside when young. *Staminal-tube* 2 in. long, purple, cylindrical, longitudinally ribbed, glabrous, suddenly expanded at the apex with 20-30 linear teeth with 10-12 apiculate anthers at their base. *Ovary* 5-celled ; stigma capitate. *Drupe* 5-6 in. across, globose, generally 5-celled and 5-seeded, yellow when ripe, at first quite smooth but wrinkled in drying, remaining long on the tree after ripening.

Fairly common, especially under cultivation in tea gardens, where it is often planted for firewood, as it grows very fast, and coppices extremely well.

Heart-wood reddish brown and takes a good polish ; weight about 40 lbs. per c. ft. The bark is very bitter and is used as an anthelmintic. The leaves also have medicinal properties and are lopped for fodder.

Leafless 12-3. Fl. 3-5. Fr. cold season.

2. **Melia composita** Willd. incl. *M. Toosandan*, Sieb. et Zucc. Syn. *M. dubia*, *F. B. I.* Vern. same as of the preceding species,—also the following :—*Hanti-phi-arong*, *Han-hodak*, Mik. ; *Kerewal*, Kuki ; *Aming-gok*, *Gingsimok* or *Gingsinmok*, Garo ; *Dieng-jah-rasang*, *Soh-dieng-lang*, Khasi.

A fairly large deciduous tree up to 65 ft. in height and 6 ft. in girth. Bark blackish and with close vertical fissures outside, creamy white or very light-brown inside ; young shoots and inflorescence covered with scurfy stellate tomentum ; branchlets stout, speckled with raised round lenticels. *Leaves* 1-2 ft. long, 2-3 pinnate ; pinnæ 3-5 pairs ; rachis terete. *Leaflets* 5-11 or 3 ;

* A tree 50 ft. in height and 6 ft. 7 in. in girth was measured on 25th March 1914 in front of the Inspection Bungalow at North Lakhimpur.

petiolulate, ovate-lanceolate to ovate round, acuminate often more or less oblique at the base, serrate or entire, membranous, glabrescent with age; main lateral nerves 6-10 on either side of the midrib, sub-horizontal; nervules finely reticulate; petiolules up to .3 in., those of the terminal leaflets usually longest. *Panicles* 5-7 in. long, many flowered. *Flowers* .3-.35 in. long, white or light mauve, inodorous. *Calyx* 5-partite, tomentose; lobes ovate-oblong. *Petals* linear-spathulate, concave, pubescent outside, puberulous inside. *Staminal tube* white, gibbous at the base, slightly expanded at the apex, with 10 bifid teeth, nearly glabrous or pubescent inside; anthers sessile, inserted behind the teeth. *Style* as long as the staminal tube; stigma large, globose 5-toothed. *Drupe* .8-1.2 by .7-.9 in., smooth but speckled with raised round dark-brown dots; stone perforated at both ends, deeply lobed at the apex, 5-7 celled, 1-6 seeded; seeds lanceolate, with a black shining testa; cotyledons oily.

Throughout UPPER ASSAM ascending to about 5000-ft. in KHASI HILLS in deciduous tracts, not very common.

Economic uses same as of the last species.

Leafless 12-3. Flrs. 3-4. Fr. ripens-12-2.

3. *Melia superba* Roxb. Syn. *M. birmanica* Kurz. Vern. same as of the preceding species.

A large tree supposed to differ from the foregoing species by having larger leaves, ovate or ovate-cordate, obscurely reticulate leaflets on winged petiolules, greenish-white; flowers with an offensive smell, 10-ribbed, wooly staminal column and a globose smooth fleshy drupe. Other characters are more or less identical.

Hardly a different species.

Found in the same localities as, and very liable to be mistaken for, *M. composita*.

3. HEYNEA Roxb

***Heynea trijuga* Roxb. Vern. *Theng-are-arong*, Mik.; *Rolang-phang*, *Rathang-phang*, Cach.; *Komal-siuli*, Nep.; *Khag-man-chhi*, Tipp.**

A handsome tree up to 40 ft. in height and 3 ft. in girth, practically evergreen; young parts pubescent; bark dark-brown, vertically furrowed, rough, bright-red underneath the thick corky layer, .3 in. thick, inside very 'cheesy,' in extremely fine concentric layers which are more or less wavy or even looped at intervals. *Leaves* alternate, somewhat crowded at the ends of branchlets, imparipinnate, having a bitter taste, 9-15 in. long; rachis terete, jointed at the nodes; leaflets 5-11, usually 7, the lateral opposite, 2-6 by 1-3.5 in., terminal largest, ovate-oblong or lanceolate, acuminate, oblique at the base, entire, membranous, dark-green and glabrous above, pale or glaucous, sometimes pubescent beneath; lateral nerves 10-14 on either side of the

midrib, anastomosing towards the outer extremity, the lowest pair or two sub-basal; nervules very fine and elegantly reticulate; petiolules '3-8 in. long. *Panicles* axillary, 9-12 in. long including the 5-7 in. long peduncle, corymbosely branched, with small subulate bracteoles at the base of ramifications, extremities bearing short cymes, pubescent. *Flowers* white, about '2 in. across; buds globose; pedicels short. *Calyx* small, usually 5-fid, hairy outside, broadly ovate. *Petals* usually 5, puberulous outside, suberect, narrowly imbricate, margins finely ciliate. *Staminal-tube* short, 8-10 lobed; lobes bifid, yellow, hairy within, alternately slightly shorter; anthers apiculate, inserted between the clefts of lobes. *Disk* fleshy, annulate. *Ovary* sunk in the disk, 2-3 celled with two ovules in each cell; style short, dilated upwards; stigma bluntly 2-fid with a thickened discoid base. *Capsule* about '5 in across, globose, splitting into two valves, remaining long on the tree after splitting; seed solitary, with a thin white aril, exalbuminous; testa brown, turning almost black, shining.

DARRANG in UPPER ASSAM, fairly common in the NORTH CACHAR and JAINTIA HILLS, also sal forests in NOWGONG, e. g., Kholahat Reserve ascending to about 2000 ft.

Wood grey, moderately hard, fine grained, weighing about 55 lbs., per c. ft., suitable for posts and agricultural implements. The seeds give an oil which can be burnt in lamps.

Fls. 1-5. Fr. 9-1.

4. DYSOXYLUM Bl.

Trees, often with a garlic-like smell. *Leaves* pinnate; leaflets opposite or alternate, entire, acuminate, more or less oblique at the base. *Flowers* hermaphrodite, in lax axillary panicles of cymes. *Calyx* 4-5-fid, open in bud. *Petals* 4-5, oblong, spreading. *Staminal column* cylindrical, toothed at the mouth; anthers 6-10, small, inserted below the edge of the staminal tube. *Disk* tubular surrounding and often exceeding the ovary. *Ovary* hairy, free, 3-4 celled, usually with two ovules in each cell, narrowed into a long style; stigma broadly capitate. *Capsule* pear-shaped or globose, coriaceous, loculicidally 1-4 celled; seeds exalbuminous, sometimes arillate.

I. Panicles spreading. Leaflets opposite or alternate :-

A. Disk densely hairy at the mouth; leaflets glabrous; capsule usually up to 2 in. across. .. 1. *D. procerum*.

B. Disk glabrous at the mouth :-

Leaflets opposite, glabrescent beneath; capsule less than 1 in. in length. .. 2. *D. Hamiltonii*.

Leaflets alternate, velvety beneath; capsule 2 in. or more in length. .. 3. *D. grande*.

II. Panicles narrow, racemiform or spicate. Leaflets alternate :-

A. Calyx bowl-shaped, sub-entire :-

Leaflets glabrous, obliquely broad ovate; tertiary nerves indistinct.

.. 4. *D. binectariferum*.

B. Calyx cup-shaped, deeply lobed :-

Leaflets broad ovate-oblong ; tertiary nerves indistinct ; disk glabrous both outside and inside, capsule pubescent. Leaflets narrowly oblong or lanceolate ; tertiary nerves strongly reticulate ; disk glandular-pubescent.

.. 5. *D. pallens*... 6. *D. reticulatum*.

1. *Dysoxylum procerum* Hiern. Vern. *Katum-asing*, Abor ; *Galing-libor*, Miri & Abor ; *Khrang*, Mik. ; *Amari*, Lali, Ass. ; *Kasshok*, *Thing-tupui*, Kuki (N. C. Hills) & Lushai ; *Ratasahatta*, Lushai ; *Thakhau-phang*, Cach. ; *Patamari*, Mech. ; *Bol-chhachhat*, Garo, *Chachat*, *Bol-sachat*, *Makhaibo*, Garo.

A fairly large tree ; bark greenish-grey or greyish-brown, fairly plain up to middle age, afterwards somewhat rough with distant irregular scales, inside pink or reddish-brown with distant white streaks, exuding white milky resin ; young shoots slightly pubescent. *Leaves* 1·5-2 ft. long, pari- or impari-pinnate ; rachis terete ; leaflets 7-13, opposite or alternate, 6-12 by 2·5-4·5 in., obovate or elliptic-oblong, slightly oblique at the base, thinly coriaceous, glabrous ; lateral nerves 12-16 on either side of the midrib ; petiolules stout, 2·5 in. long. *Panicles* erect, stiff, 12-26 in. long with short horizontal puberulous branches ; bracts subulate ; pedicels very short, bracteolate ; buds pubescent. *Flowers* 3·5 in. long, cream-white, fragrant. *Calyx* pubescent ; lobes acute, short. *Petals* 4, oblong, valvate. *Anthers* 8, subsessile. *Disk* about one-third to two-thirds the length of the staminal tube, hairy at the mouth, encircling the hairy ovary ; style slightly exceeding the staminal tube. *Capsule* up to 2·5 in. long, pyriform ; seeds 2-3, black and shining with an orange aril.

Fairly common throughout the province, especially in the evergreen forests of UPPER ASSAM. Heartwood bright red, weighing about 40 lbs per c. ft., much used for doors and windows.

Flrs. 12-1. Fr. 5-7.

2. *Dysoxylum Hamiltonii* Hiern. Vern. *Gendheli-poma*, Up. Ass. ; *Keotai*, Ass. (Darr.) ; *Siti-asing*, Miri ; *Situk-payu*, Abor ; *Mauhidai*, Cach. ; *Thing-saphu*, *Inthei*, Kuki ; *Bol-asin*, Garo ; *Dieng-kyrbei*, Khasi.

A fairly large evergreen tree ; bark splits from below and thus overlaps like scales, dark-brown outside, pale-brown or whitish inside with reddish-brown streaks strongly smelling of garlic. *Leaves* 1·5-2·5 ft. long, suberect, generally paripinnate ; rachis terete ; leaflets usually 10-18, but on young poles up to 42, opposite or subopposite, drooping, 4-6 by 1·5-2 in., oblong to oblong elliptic, subfalcate, caudate acuminate, oblique at the base, membranous, glabrous or hairy beneath, smelling of garlic when bruised, turning pale-yellow when old ; lateral nerves 12 on either side of the midrib, slender, dilated at the base and slightly concurrent with the midrib. *Panicles* about 6-9 in. long with puberulous branches ; bracts and bracteoles minute ; pedicels

slender up to 1 in. long. *Flowers* 4-merous, about .25 in. long, greenish-white. *Calyx* very small, pubescent. *Petals* 4, glabrous. *Staminal tube* pubescent, bearing 8 anthers. *Disk* glabrous, twice as long as the pubescent ovary. *Capsule* about 1 in. diam., globose, 4-celled, 4-seeded, pale-yellow or almost white, smelling very strongly of garlic; seeds with a pale or reddish aril.

N. E. F. DISTRICT, LAKHIMPUR, SIBSAGAR, CACHAR, Bhuban hill, DARRANG, NOWGONG, KHASI HILLS up to 2500 ft., SYLHET and GARO HILLS, not common.

Heartwood red, moderately hard; weighing about 40 lbs per c. ft., used for boats and house-building, said to be very durable. The fruit is greedily eaten by monkeys.

Flrs. 11-12. Fr. 1-2.

3. *Dysoxylum grande* Hiern. Vern. *Boga-banderdima*, Ass.

A middle-sized tree; bark thin, dark-grey, fairly smooth outside; young shoots including leaves and inflorescence covered with velvety greyish tomentum. *Leaves* 1.5-2 ft. long; common petiole flattened or slightly channelled near the base. *Leaflets* 12, alternate, 5-8 by 2-3 in., oblong, caudate acuminate, rounded at the base, chartaceous, glabrous or glabrescent above except along the midrib and lateral nerves, grey-velvety beneath; main lateral nerves 20-25 on either side of the midrib, rather straight; petiolules about .25 in. long. *Panicles* about as long as the leaves. *Flowers* .15-.2 in. long, 4-merous, in small cymose clusters; pedicels slender, very short. *Calyx* very small, pubescent; lobes short, acute. *Petals* grey, pubescent outside. *Staminal-tube* thinly pubescent or glabrous outside, terminating in bifid teeth. *Disk* glabrous, exceeding the hairy ovary. *Capsule* 2 in. or more (?) in length, pyriform, glabrous, generally 1-seeded; seed ellipsoid about 1 in. long; testa dark-brown, shining.

Either rare or often mistaken for its other co-geners, Nambor forest, SIBSAGAR, SYLHET-Brace (!).

Wood weighs 47 lbs per c. ft. and is apparently put to the same uses as of the preceding species.

Flrs. Rainy season. Fr. 12-1?

4. *Dysoxylum binectariferum* Hk. f. et Bedd. Vern. *Galingasing*, Miri; *Bandardima*, Ass.; *Khrang-kelok-arong*, *Khrang*, Mikir; *Bon-dau-iung*, *Rata*, Cach.; *Kakso-kchal*, Kuki; *Heren-thak-chi-ching*, Naga; *Kaksok*, Tipp.; *Hota-rata* Sylh.; *Dingari-guphut*, *Dingari*, *Dingyi-bomphang*, Mech.; *Bol-narang*, *Masispel*, Garo.

A tree up to 50 ft. in height and 4 ft. in girth; young shoots and inflorescence minutely pubescent; bark grey outside, nearly smooth and warty on young stems, afterwards with light vertical fissures and horizontal wrinkles peeling off in thin papery flakes, pale, yellowish brown inside, mottled with coarse strands of darker brown. *Leaves* 1-1.5 ft. long; leaflets 6-8, alternate, 3-7.5 by 1.5-3.5 in., obliquely ovate-oblong, short-usually abruptly

acuminate, entire or with obscure distant teeth, thinly coriaceous, glabrous and dark-green above, pale underneath; lateral nerves 5-10 on either side of the midrib, much arched; tertiary nerves invisible; petiolules 2-3 in. long, channelled. *Panicles* 9-15 in. long; branches short. *Flowers* pale-white, about 25 in. long, tetramerous. *Calyx* thick, cup-shaped, subentire, about half as long as petals. *Petals* velvety outside. *Staminal tube* mealy. *Disk* much exceeding the ovary, glabrous inside, 8-toothed; anthers 8. *Ovary* hairy. *Capsule* 2-2.5 in. long, globose with a narrowed base, smooth, at first pale-yellow, turning deep-orange, 4-celled, 4-seeded; seeds shining purple with a large yellow hilum; aril white; cotyledons green, plumule hairy.

Fairly common throughout the province up to 3000 ft. in the hills.

Wood red or reddish grey, rough, weighing 44 lbs per c. ft., pores joined by wavy concentric lines of softer tissue.

It is made into planks and used for house building.

Flrs. 4-5. Fr. cold season.

5. *Dysoxylum pallens* Hiern. Vern. *Bandordima*, Ass., *Makkhaibo*, Garo.

A small tree with a spreading crown, somewhat resembling *D. binectariferum* in general appearance and foliage; bark dark-brown and plain outside, reddish brown with streaks of lighter colour inside. *Leaves* usually 1-2 ft. long; leaflets 6-10, alternate, 4-9 by 2-4 in., oblong or ovate-oblong, apex shortly but somewhat abruptly tailed, thinly coriaceous, oblique at the base, glabrous; lateral nerves 15-20 on either side of the midrib, arched, slender but prominent; tertiary nerves indistinct; petiolules 2-2.5 in. long, stout. *Racemes* spike-like, 1-10 in. long, puberulous; pedicels about 1 in. long, stout. *Flowers* greenish-white, sweet-scented, 2-3 in. long. *Calyx* cup-shaped, deeply 4- (rarely 5) -lobed, puberulous. *Petals* 4, rarely 5, thick, valvate, pubescent outside. *Staminal tube* and *disk* wholly glabrous, the latter scarcely exceeding the ovary, somewhat unevenly about 20-toothed. *Anthers* exserted. *Style* columnar. *Capsule* 1-1.5 in. diam., velvety outside.

UPPER ASSAM, e.g. LAKHIMPUR, SIBSAGAR and DARRANG.

The wood is not used as timber.

Flrs. 2-3.

6. *Dysoxylum reticulatum* King. Journ. As. Soc. Beng. Vol. 65 ii. 114. (1897). Vern. *Bandordima*, Ass.

A small tree up to about 35 ft. in height with a cylindrical straight trunk; bark grey and warty outside, hard and fibrous, pale yellow inside with golden-brown streaks. *Leaves* usually 1-1.5 ft. long, pale-green; rachis flattened above; leaflets about 14, alternate or subopposite, rarely opposite, 3-7 by 1.5-3 in., ovate or ovate-lanceolate, finely acuminate, chartaceous, glabrous; lateral nerves about 15 on either side of the midrib, arcuate, tertiaries conspicuous, subparallel, closely reticulate; base rounded or acute, unequal; petiolules 1.5-2 in. long. *Racemes* about

10 in. long. *Flowers* 4-merous, .25 in. long ; buds ovoid. *Disk* fleshy, glandular-pubescent. *Capsule* 2.5-3 by 2-2.5 in., pyriform, yellow (drying dark-brown), verrucose, with numerous more prominently verrucose longitudinal ridges ; seeds 1.2 by 1 in., cotyledons green.

LAKHIMPUR and SIBSAGAR Divisions, possibly also DARRANG.

Fls. 4-5 (?), Fr. ripens 3-4.

5. CHISOCHETON* Bl.

Chisocheton paniculatus Hiern. Vern. *Bandordima*, Ass. ; *Diengsoh-monashrieh*, *Dieng-mar-iony*, *Dieng-soh-khyllam-blang*, *Dieng-soh-run-blang*, Kh. ; *Rata*, *Thaikhukisin-bapang*, Cach. ; *Khrankerarong*, *Theng-kippi*, Mik. ; *Sahata-pui*, Kuki ; *Masrusiphel*, *Makkhaibo*, Garo ; *Ratapangpa*, Tipp. ; *Chota-Dingari*, Mech.

A small tree scarcely exceeding 40 ft. in height and 2.5 ft. in girth, with ascending branches and a narrow crown ; young shoots and inflorescence brown hirsute ; bark dark-brown outside, plain but warty, exfoliating in distant round flakes, often with white blotches (of lichen ?) ; inside light dun-brown oxidising to dirty purple on exposure. *Leaves* 2-4 ft. long, dark-green ; rachis hairy ; leaflets 7-33, opposite or subopposite, 3-10 by 1-4 in., oblong ; ovate-oblong, or lanceolate, acuminate, entire, chartaceous, glabrescent above, thinly pubescent, especially along the nerves beneath ; lateral nerves 7-13 on either half, obliquely arcuate, ends parallel to the leaf margin, prominent beneath ; petiolules short. *Panicles* axillary, 2-3 ft. long, drooping with elongated lax branches. *Flowers* polygamous, pale yellow, .5-7 in. long, faintly scented, 4-merous ; pedicels 1-1.5 in. long, articulated below the calyx ; buds .5-6 in. long, club-shaped. *Calyx* small, cup-shaped, sub-truncate. *Petals* starp-shaped, imbricate, minutely puberulous. *Staminal* tube white, as long as the petals, with 6-8 obscure bifid lobes, more or less pubescent ; anthers 8, sessile, linear, included. *Disk* short, fleshy. *Ovary* 4-celled, each cell usually with one ovule ; style slender, pubescent below, slightly exceeding the anthers. *Fruit* a capsule, 1.5-3 in. across, globose with a pyriform base, smooth and shining, dark orange or red ; seeds black, shining with a white or yellow aril ; endocarp fleshy.

Fairly common throughout the province ascending to about 3000 ft., the mature fruit hangs in long drooping bunches.

Wood yellowish, sometimes used for house posts.

Fls. 6-7. Fr. cold season.

6. MUNRONIA Wight.

Munronia Wallichii Wt. Vern. *Nolsing* Garo.

An undershrub about 3 ft. in height ; young shoots and inflorescence hirsute. *Leaves* crowded at the ends of the shoots,

* Also written Schizocheton.

alternate, imparipinnate, 5-12 in. long ; rachis pubescent. *Leaflets* 7-9, opposite, 1-5 by 4-1.7 in., lanceolate or ovate to oblong-lanceolate, blunt acuminate, entire or obscurely sinuate, pubescent along the midrib and nerves beneath ; lateral nerves 5-6 on either half, distant, arcuate ; base rounded or narrowed, often oblique ; petiolules of lateral leaflets short, of terminal leaflets up to 5 in. long. *Flowers* conspicuous, white or pale pink, hermaphrodite, hairy outside, few, clustered on axillary peduncles towards the ends of shoots ; peduncles 4-7 in. long ; pedicels 2-4 in. long ; bracts linear, small. *Calyx* 5-partite ; segments 25 in. long, oblong-spatulate, persistent and becoming red in fruit. *Petals* about 9 in. long, imbricate, narrow-spathulate, long clawed, claws cohering for most of their lengths. *Staminal tube* about 6-7 in. long, dilated upwards, 10 toothed at the apex, glabrous ; anthers 10, terminal, alternating with the teeth, apiculate, pilose on the back along the connective. *Disk* membranous, tubular, entire, glabrous, enclosing the ovary and the base of the style. *Ovary* 5-celled, each cell 2-ovuled ; ovules superposed ; style slender, exceeding the staminal tube, lower half pilose ; stigma capitate. *Capsule* 5-75 in. across, depressed, globose with uneven surface, hairy, bright red, loculicidally 5-valved, valves separating from the axis ; seeds black, shining, plano-convex, not winged, hilum hollowed, with radiating lines ; albumen thin.

GARO HILLS, KHASI HILLS ascending to 4400 ft. ; in thick forest undergrowth.

Flrs. & Fr. cold season.

7. AMOORA Roxb.

Trees generally with resinous milky juice. *Leaves* imparipinnate, exstipulate ; leaflets opposite or alternate, quite entire, oblique. *Flowers* polygamous, as a rule 3-merous, male paniculate, female spicate or racemose. *Calyx* 3-5-fid. *Petals* usually 3, thick, concave, imbricate. *Staminal tube* globose, crenate or toothed at the apex ; anthers 6-10, included, inserted at the crenatures. *Disk* obsolete. *Ovary* short, usually 3-celled ; stigma usually sessile. *Fruit* a loculicidally 3-5 valved capsule. *Seeds* arillate ; testa coriaceous, shining ; albumen 0 ; cotyledons connate.

- I. Leaflets opposite. Flowers subsessile, male on branched, female on simple spikes. Calyx 5-partite. .. 1. *A. Rohituka*.
- II. Leaflets opposite or subopposite, not lepidote. Flowers pedicelled. Calyx 3-lobed :—
 - Leaflets obtuse. Male racemes paniced, female simple, short. Anthers 10. .. 2. *A. cucullata*.
 - Leaflets abruptly acuminate, racemes as in 1 or male and female flowers on the same panicle. Anthers usually 8. .. 3. *A. Wallichii*.
- III. Leaflets alternate, lepidote along petiole and nerves. Flowers pedicelled. Calyx cup-shaped, obtusely 3-toothed or truncate. Stamens 6. .. 4. *A. chittagonga*.

1. **Amoora Rohituka** W&A. Vern. *Amari*, *Boga-Amari*, *Hakhori-bakhori*, Ass. (Kam); *Titraj*, *Tiktaraj*, Beng.; *Wokek-turang*, Mik., *Galua*, Naga; *Biqu-rata*, *Thai-thor*, *Thai-dau-ing*, *Mouksa-khaslam-phang*, *Kak-sok-thing*, *Thing-ril-char*, Kuki; *Gokul*, Nep.; *Baidraj*, *Beri-Rata*, Sylh.; *Bagu-Rata*, Cach.; *Eng-Gokmi*, *Bolsamphal*, Garo; *Bhoto-mayna*, *Jharua*; *Dieng-Rata*, Khasi; *Dieng-lang-marei*, Khasi (Shella); *Dieng-soh-khyllam-blant*, Khasi (Thlew-slyrngam).

A middle-sized evergreen tree with a dense spreading crown; bark greyish-brown outside exfoliating in circular pieces, warty, bright red underneath the corky layer, red inside, gradually lighter inwards, with distant broad streaks of lighter tissue, fibrous, aromatic, generally exuding milky resin from the inner layers; young parts tawny pubescent. *Leaves* crowded at the ends of the branchlets, 12-24 in. long, vivid green; leaflets 9-19, opposite, 3-9 by 1.5-4 in., ovate, oblong or obovate, acuminate, often abruptly; lateral nerves 12-16 on either side of the midrib, slender, slightly arched, subcoriaceous, ultimately glabrous; base very oblique; petiolules 1.5-2 in. long. *Male spikes* panicle about as long as the leaves; *female* simple, much shorter. *Flowers* sessile, rarely very shortly pedicelled, dull-white; bracts minute at the base of the fls.; *female* about .25 in. long, *male* much smaller. *Calyx* 5-partite; lobes rounded and with very thin ciliate margins. *Petals* 3, broad elliptic to orbicular, concave. *Anthers* 6, about .1 in. long, lanceolate. *Ovary* 3-celled with two superposed ovules in each cell. *Capsule* 1-1.5 in. long, obovate in outline, yellow when ripe, smooth, 3-valved. *Seeds* usually not more than 2 in each fruit, with a red aril and shining black testa, oblique.

Common though not abundant, throughout the province, excepting hills above 2500 ft.

The timber weighs about 40 lbs per c. ft. and is moderately hard and even and close-grained, but it is brittle and is not much used. An oil is obtained by boiling the macerated seeds in water. It is burnt in lamps and is also used as a liniment in rheumatism and as a dressing for sores.

Fls. 10-11. Fr. 2-3.

2. **Amoora cucullata** Roxb. Vern. *Bor-amari*, Ass. (Sibs.); *Samphal*, Garo.

An evergreen tree up to 80 ft. in height and 7 ft. in girth with grey bark and numerous blind suckers from the roots. *Leaves* 1.5-2.5 ft. long; leaflets opposite or subopposite, 3-13, ovate-oblong, obtuse at both ends, subcoriaceous, glabrous, oblique at the base, the terminal one often falcate; main lateral nerves about 16 on either side of the midrib; petiolules up to about .5 in. long. *Male panicles* drooping, about as long as the leaves; *female racemes* much shorter, few-flowered. *Flowers* yellow, each supported by a pair of caducous bracts. *Calyx* 3-lobed. *Petals* 3. *Staminal tube* turbinate. *Anthers* sessile, included. *Ovary* 3-celled with 2 ovules in each cell. *Capsule* 2.5 in. diam., pyriform-globose, obtusely 3-lobed, 3-valved. *Seeds* 3, with an orange-coloured fleshy aril which covers about three-quarters of each seed.

Very rare. Only once found in the Daigurung Reserve, SIBSAGAR DIVISION.

Wood red, hard and close-grained, weighing about 43 lbs per c. ft. Being liable to split it is seldom used as timber.

Fls. 10-11 (?). Fr. 4-5.

3. *Amoora Wallichii* King. incl. *A. spectabilis* F. B. I, Vern *Amari*, *Bhoto-mayna*, Ass.; *Galing-asing*, Miri; *Dire-asing*, Abor; *Bong-lepbuphang*, Cach.; *Rongi-Rata*, *Phul-Rata*, Cach. and Sylh. *Ringok-me*, *Samphal*, Garo; *Sahatcha-kung*, Tipp.; *Pat-amari*; *Mech*; *Wang-la-bei*, Khasi.

An evergreen tree up to 80 ft. in height and 8 to 9 ft. in girth; often buttressed at the base; bark even but not smooth, grey, about 3 in. thick, light pink inside with streaks of darker pink or white, exuding white gum, turning brown after exposure; young parts brown pubescent. *Leaves* 1.5-2 ft. long, tawny puberulous when young; leaflets 11-13; 4-8 by 1.5-2.5 in., opposite or subopposite, oblong, usually abruptly acuminate, thinly coriaceous, shining above when mature, glaucescent beneath; lateral nerves 10-12 on either side of the midrib, slender but raised and distinct-beneath, slightly arched; base rounded; petiolules 2-3 in. long. *Panicles* axillary or supra-axillary, puberulous; *male* much branched and many flowered, 15-18 in. long; *female* 6-8 in. long, less profusely branched. *Flowers* very small. *Calyx* minute, obtusely 3-lobed, tawny-puberulous. *Petals* 3, about 1 in. long, suborbicular, minutely stellate pubescent. *Staminal tube* urceolate, glabrous. *Anthers* usually 8, slightly exserted. *Capsule* 1-1.5 by .8-1 in., pyriform. tomentose.

Fairly common in UPPER ASSAM in evergreen forests, also in the SURMA VALLEY.

Wood red, hard, close-grained, weighing about 49 lbs. per c. ft., med. rays uniform, pores large. It is a very good timber for furniture and doors and windows.

Flrs. 8-9. Fr. 1-2.

4. *Amoora chittagonga* Hiern. Vern. *Gangru-changne*, Duff.; *Ponthikechauphang*, Mik.

Apparently a very precocious tree, saplings not more than 10 or 12 ft. in height being found with flower or fruit; young parts also calyx and fruit lepidote with thin silvery scales; bark greyish-brown, smooth on old stems, exfoliating in small scales or peeling off in scrolls; 3 in. thick; inside whitish, exuding milky resin. *Leaves* 6-12 in. long; rachis lepidote; leaflets generally 4-6, alternate or subalternate, 2.5-7 by .8-3 in., elliptic, oblong-elliptic to lanceolate or obovate, bluntly acuminate, slightly or not oblique at base, almost membranous, lepidote along the midrib and nerves esp. when young; lateral nerves 12-16 on either half; petiolules 1-1.5 in. long, stout. *Male panicles* fascicled from the axils of leaves, 4-6 in. long, lax, with slender ramifications and pedicels; *female* shorter, few-flowered with shorter and stouter pedicels. *Calyx* cup-shaped, usually 3-lobed.

Petals 3, sometimes 4. *Staminal tube* urceolate. *Fruit* indehiscent, 2-3 celled, obovoid-globose, about 1 in. long, usually not more than 2 seeded.*

Fairly common in UPPER ASSAM, esp. NORTH LAKHIMPUR and DARRANG.

Wood hard and heavy, used for house posts. The lac insect is sometimes reared on this tree.

Flrs. 3-4. Fr. 11-12.

8. AGLAIA Lour

Trees or shrubs, often lepidote. *Leaves* pinnate or 3 foliolate; leaflets generally opposite, quite entire. *Flowers* polygamous, usually very small, in large panicles. *Calyx* with 5 imbricate lobes. *Petals* 5, concave, imbricate. *Staminal tube* urceolate or globose, 5-toothed at the apex or truncate; anthers usually 5, rarely more, erect, included or half exserted. *Disk* obscure. *Ovary* 1-3-celled with 2 or 1 ovule in each cell. *Fruit* a dry berry, 1-2 celled and 1-2 seeded. *Seed* with a fleshy testa, without albumen.

I. Shoots and inflorescence covered with round scales; adult leaflets glabrous:—

A. Leaflets 3-7:—

Panicles much shorter than the leaves.

Flowers .2 in. across.

.. 1. *A. khasiana*.

Panicles about as long as the leaves.

Flowers about .75 in. across.

.. 2. *A. Roxburghiana*.

B. Leaflets 9-13:—

Panicles about as long as the leaves.

Flowers minute.

.. 3. *A. perviridis*.

II. Shoots and inflorescence covered with scales and stellate pubescence, undersurface of leaves more or less stellate pubescent:—

Panicles about as long as the leaves.

Flowers small.

.. 4. *A. edulis*.

1. *Aglaia khasiana* Hiern.

A small tree; young parts lepidote. *Leaves* 6-12 in. long; leaflets 3-5; 4-8 by 1-2 in., narrow-elliptic, glabrescent; petiolules .3-1 in. long, slender. *Panicles* much shorter than leaves, dense, with short patent branches, ferruginous. *Flowers* large for the genus, generally .2 in. across, subsessile. *Fruit* 1 in. diam.

MIKIR HILLS; also KHASI and NORTH CACHAR HILLS.

2. *Aglaia Roxburghiana* Miq. Syn. *A. odoratissima* Blume.

A small tree (in our area) attaining about 35 ft. with brownish-grey somewhat rough bark; blaze red, fibrous; young parts lepidote. *Leaves* 3-8 in. long; rachis ultimately glabrate; leaflets 3-7, opposite, 2-6 by 1-2.5 in., elliptic-oblong or oblong,

* This description has been given from specimens identified as *Amoora chittagonga* Hiern, at the Sibpur Herbarium. It however agrees in many respects with that of *A. canarana* Benth, which according to Talbot occurs in Assam and Eastern Bengal.

obovate to ovate ; apex subobtusely or bluntly short acuminate, often emarginate, subcoriaceous. glabrous above, sparsely lepidote along midrib and nerves beneath ; base rounded or cuneate ; petiolules 2-5 in. long (those of the terminal leaflets longest). *Panicles* axillary or supra-axillary, about as long as the leaves, pyramidal, lepidote. *Flowers* globular ; pedicels short. *Calyx* lobes rounded, ciliolate, lepidote-pubescent outside. *Petals* yellow, 5 in. long, much exceeding the calyx, glabrous. *Staminal tube* shorter than the petals, obscurely 5-lobed. *Ovary* small, stellately lepidote. *Berry* up to 7 in. long, subglobose, buff tomentose, usually 1-seeded.

A solitary record from Sanitarium hill GARO HILLS about 4000 ft. (Sheet No. 5245).

The pulp of the fruit is edible.

Flrs. rainy season. Fr. cold season.

3. *Aglaia perviridis* Hiern. Vern. *Thaidubriki-buphang*, Cach.

A small tree ; young parts lepidote. *Bark* greyish-brown, rather rough outside and fibrous, reddish-brown with beautiful streaks of deeper red and with an aromatic smell inside. *Rachis* 6-11 in. long, more or less lepidote, glabrate with age. *Leaflets* 9-13, opposite or sub-opposite, 3-6 by 7-2 in., lanceolate, narrow lanceolate or ovate-oblong, acuminate, glabrate with age, coriaceous ; lateral nerves 14-18 on either half ; base narrowed or rounded ; petiolules 3-5 in., that of the terminal leaflet longest, channelled. *Panicles* axillary about as long as the leaves, at first lepidote, glabrate with age ; bracts and bracteoles very small, lanceolate ; buds puberulous. *Flowers* white, minute. *Fruit* obliquely globose ; about 12 in. long, closely invested with brown scales.

CACHAR HILLS, KHASI HILLS ascending to 2000 ft. (Hooker).

Wood reddish brown, med. rays fine, pores joined by fine wavy concentric lines of soft tissue.

Flrs. 5-6. Fr. 12 ?

4. *Aglaia edulis* A. Gray. Vern. *Khrang*, Mik. ; *Thing-ril-char*, Kuki ; *Dieng-soh-longar*, Khasi.

A fairly large tree up to 75 ft. in height and 6 ft. in girth with fluted stem ; young parts covered with stellate hairs and scales mixed ; bark grey, plain outside, exfoliating in round or irregular-shaped flakes, red underneath the epidermis, 2 in. thick, reddish-brown and softly fibrous inside with very faint white streaks exuding a thin milky sap. *Leaves* 1-2 ft. long : leaflets 9-13, 3-9 by 1-3 in., opposite or subopposite, broad-elliptic to narrow-oblong, or lanceolate, obtusely acuminate, chartaceous, covered with stellate hairs, mixed with ferruginous scales, specially on the nerves beneath or glabrescent ; lateral nerves about 16 on either side of the midrib ; base of lateral leaflets slightly oblique ; petiolules 2-3 in. long, stout. *Panicles* 5-8 in. long, pyramidal. *Flowers* small, pedicelled. *Fruit* about 1 in. across, globose, covered with thin buff scales, up to 3-celled, usually 2-seeded.

Soudangpathar in the Doyang Reserve, SIBSAGAR. Also south-eastern slopes of the MIKIR HILLS, and the NORTH CACHAR HILLS; up to 1900 ft. in KHASI HILLS.

Wood dark-brown with wavy bands of softer tissue, very hard, medullary rays very fine, close and parallel, pores scanty. Suitable for posts, tent-pegs and agricultural implements. The fleshy integument of the seeds is eaten.

Flrs. ? Fr. 2-3.

A. Wallichii Hiern.—*Branchlets* terete. *Leaf rachis* sharply margined. *Leaflets* 5-9, very thinly coriaceous, 2-2·5 by 1·8-1 in., elliptic or ovate lanceolate, acuminate; lateral nerves about 10 on either half, indistinct near the apex; petiolule 1·5 in., channelled. *Panicle* with angled rachis and branches, mostly puberulous, about equalling leaves. *Flowers* minute. *Calyx* lepidote, shortly ciliate. *Corolla* glabrous. *Berry* not seen.

SYLHET (Wallich) Record based on a solitary specimen No. 8036 Wallich's catalogue in Herb. Calcutta.

9. WALSURA Roxb.

Trees. *Leaves* 1-foliate or pinnately 3-5 foliate; leaflets opposite, entire, pale beneath. *Flowers* 2-sexual, small, in axillary and terminal panicles. *Calyx* short; lobes 5, imbricate. *Petals* 5, ovate-oblong, spreading, slightly imbricate or subvalvate. *Stamens* usually 10; filaments free and thin, linear or subulate, or connate in a tube, usually notched at the apex, each bearing an anther at the notch. *Disk* annular. *Ovary* small, 2-3 celled, imbedded in the disk; style short; ovules 2 in each cell. *Fruit* indehiscent, 1-2 seeded; seeds enclosed in a fleshy aril, exalbuminous.

Leaflets usually 3. Stamens connate the whole way. .. 1. *W. tubulata*,
 Leaflets usually 5. Stamens free or only slightly
 connate at base. .. 2. *W. robusta*.

1. Walsura tubulata Hiern.

A small tree up to about 40 ft. in height and 2·5 ft. in girth; branchlets covered with raised lenticel specks; young shoots and inflorescence brown pubescent; bark light-grey, thin. *Leaves* 3-foliate; common petiole flattened above; leaflets 3-9 by 1-3 in., lanceolate to ovate or elliptic-oblong, acuminate, subcoriaceous, glabrous and shining above, glaucous beneath; lateral nerves about 10 on either side of the midrib, arched; tertiaries very close and finely reticulate; petiolules somewhat flattened, swollen at both extremities, of lateral leaflets 2-8 in. long, of terminal leaflet about double that length. *Panicles* racemose, shorter than the leaves. *Flowers* about 25 in. long, rather large for the genus, yellowish; bracts small, boat-shaped. *Calyx* 5-partite, pubescent. *Staminal tube* 5-lobed at the apex, glabrous outside, thinly pubescent inside; lobes notched at the extremity. *Fruit* not seen.

Dry forests in the neighbourhood of Lumding, NOWGONG Division, not very common. Also KHASI HILLS.

Wood hard, weighing about 60 lbs per c. ft., but liable to split irregularly.

Flrs. cold season.

2. *Walsura robusta* Roxb. Vern. *Lali*, Ass. ; *Theng-rali*, Mik. ; *Mogchouphong*, Cach. ; *Makhang-thing*, Kuki ; *Bol-khrenchi*, *Bol-dublok-Khrauchi*, Garo ; *Diengsoh-phlang*, Khasi.

A small or middle-sized tree up to 70 ft., in height and 5-6 ft. in girth ; bark dark-brown covered with fat corky warts, greenish-red underneath the corky layer which is easily separated and the inner surface of which is red and of a chequered pattern ; blaze about 5 in. thick, pinkish red, fibrous, with fine wavy streaks of whitish tissue ; branchlets covered with lenticels ; young shoots pubescent. *Leaves* 6-10 in. long ; rachis slightly flattened above ; leaflets generally 5, sometimes 3 ; 2-6 by 1-2.5 in., elliptic or oblong lanceolate, bluntly acuminate, chartaceous, glabrous, shining above, pale beneath, reddish brown, when young, turning yellow before shedding ; lateral nerves 5-7 on either half, arched, nervules closely reticulate but indistinct ; base acute ; petiolules of lateral leaflets 2-5 in. long, of terminal leaflet 1-1.5 in. long. *Panicles* mostly terminal, 4-8 in. long, rachis somewhat flattened ; branches pubescent ; bracts caducous, lanceolate, acute. *Flowers* white, about 2 in. across ; pedicels short. *Calyx* about 1 in. across, minutely 5-toothed, ferruginous-pubescent. *Petals* about 1 in. long, ovate, acute, spreading, thinly pubescent outside. *Filaments* usually 10, white, subulate, tapering to a fine point, each point bearing a globose yellow anther, subconnivent over the stigma, free or slightly connate at the base. *Disk* fleshy, slightly lobed. *Ovary* 2-celled ; style short ; stigma capitate. *Fruit* 5-7 in. long, subglobose, pubescent outside.

Foot of the MIKIR HILLS towards Lumding ; also NORTH CACHAR, GARO & foot of KHASI HILLS.

Wood brown or light red, very hard, weighing about 65 lbs per c. ft., pores joined by fine wavy concentric lines, med. rays very fine, close, liable to split, but seems suitable for agricultural implements.

Flrs. 3-5. Fr. 12-3.

10. CHICKRASSIA* Andr. Juss.

Chickrassia tabularis Andr. Juss. Vern. *Boga-poma*, Ass. (Sibs.) ; *Chokori-poma*, Ass. (Nowg.) ; *Lahripoma* (Goalpara) ; *Silling* or *Silengasing*, Miri ; *Harbi-beh*, *Haribe*, *Chany-hedim*, Mik., *Bon-ridim-phang*, Kach. ; *Jong-mel*, Kuki ; *Haithna-poma*, Sylh. ; *Thing-poi*, Tipp. ; *Bol-dorek*, *Chuma*, Garo ; *Rata-tuni* Nep.

A handsome lotty tree—(a tree 160 ft. high and 28 ft. 5 in. in girth has been measured near Pillung, N. E. F. District, in December 1913) ; branchlets lenticellate. *Bark* dark-grey outside, deeply cracked, inside fibrous, pink or light red, 5-1 in. thick. *Leaves* 12-20 in. long, often softly pubescent when young ; rachis terete ; leaflets 10-24, usually alternate, 2-6 by 2.2-3 in., ovate or elliptic-lanceolate, acuminate, entire, thinly

* Original spelling *Chukrasia*.

chartaceous, glabrescent; lateral nerves about 10 on either side of the midrib, nervules closely reticulate; base oblique and unequal-sided; petiolules .15-.2 in. long. *Panicles* terminal, shorter than the leaves. *Flowers* white, .5-.6 in. long. *Calyx* small, dentate. *Petals* white, oblong, erect, imbricate in bud. *Staminal tube* cylindrical, dark purple, 10-toothed at the apex and bearing anthers on the edge. *Ovary* hairy, usually 3, sometimes 4 celled. *Fruit* a septicidally 3 valved capsule, .15-.2 in. long, ellipsoidal, speckled with lenticels outside, valves entirely separating from the axis and consisting of two plates, inner woody, septate, striate. *Seeds* about .2 in. long, elliptic, flat with a dark-brown wing. .3-.6 in. long, very closely and transversely packed, the seed and tail ends in each series alternating, exalbuminous.

Common in the N. E. FRONTIER DISTRICT, but occurs in varied proportions in evergreen forests in all the other Districts of the province.

Wood hard, reddish-brown with a satiny lustre, weighing about 50 lbs per c. ft., very suitable for planking and furniture, but difficult to saw and plane owing to uneven course of the fibres. The bark possesses astringent properties.

Fls. 5-7. Fr. 12-3.

11. CEDRELA Linn.

Tall deciduous trees with red aromatic wood. *Leaves* pinnate. *Leaflets* opposite, subopposite or alternate; stipules 0. *Flowers* white or pale yellow in terminal or subterminal panicles of cymes, often dimorphic; pedicels often jointed. *Calyx* small, 5-cleft. *Petals* 5, imbricate, suberect, usually keeled inside at the base. *Disk* thick, 4-6 lobed. *Stamens* 4-6, rarely 10, free, inserted on the top of the disk, sometimes reduced to staminodes in the female flowers; anthers versatile. *Ovary* 5-celled; style simple; ovules pendulous, 8-12 in each cell in two series. *Fruit* a capsule, septifragally 5-valved. *Seeds* compressed, albuminous, winged at both ends (in the species described below).

Leaves mostly paripinnate, with opposite or subopposite leaflets:—

Capsule smooth or minutely lenticellate, generally not exceeding 1 in. in length; common petiole and petiolules usually glabrous.

.. 1. *C. Toona*.

Capsule nearly 2 in. long, conspicuously warty; common petiole and petiolules pubescent.

.. 2. *C. febrifuga*.

(Var. *assamensis*).

Leaves usually, imparipinnate; leaflets mostly alternate; common petiole and petiolules pubescent; capsule .6-.8 in. long, verrucose.

.. 3. *C. microcarpa*.

1. *Cedrela Toona* Roxb. Vern. *Poma*, Ass. Sylh. and Jharua; *Tun*, Beng.; *Banji-asing*, *Poma-asing*, Miri; *Poma*, *Khat-mai*, Cach.; *Hulu*, *Antei*, *Kuki*; *Tairel*, *Taireny*, Manip.; *Jia-poma*, Ass. and Mech; *Jati-poma*, Ass.; *Suruj-bed*, *Surja-poma*, Sylh.; *Intei*, Tipp.; *Harbi-beh-arong*, *poma-arong*

Mikir; *Dieng-biti*, Khasi; *Dieng-sali*, (Bhoi country), *Dieng-tyllyeny*, Khasi (Shella); *Dieng-saw*, Khasi (Isamati); *Kuma*, Synt.; *Bot-bret*, Garo.

A large handsome tree. *Bark* grey exfoliating with distant flakes of irregular shape, .6-.8 in. thick, fibrous, pinkish-red inside, mottled with fine radial streaks of white, turning brown on exposure. *Leaves* generally paripinnate, 1-2 ft. long, somewhat crowded at the ends of branchlets; common petiole glabrous, terete: leaflets 8-25, opposite or alternate, 2-5 by .7-2 in., lanceolate or ovate-lanceolate, caudate-acuminate, entire but with wavy margins, chartaceous, glabrous and shining above, often minutely pubescent and with a tuft of hairs at the axils of the secondary nerves beneath; lateral nerves 10-15 on either side of the midrib, slender, arched; base acute, oblique; petiolule .2-.5 in. long. *Panicles* shorter than the leaves, pyramidal with slender ramifications. *Flowers* white, faintly fragrant. *Calyx* small; lobes broad ovate, subacute or obtuse, grey-ciliate, puberulous outside. *Petals* .15-.2 in. long, oblong or obovate oblong, obtuse with ciliate margins. *Disk* with five hairy orange-coloured lobes. *Stamens* 5; filaments glabrous, connective apiculate. *Stigma* capitate, depressed at the apex. *Ovary* hairy. *Capsule* .7-1 in. by .2-.3 in. diam., oblanceolate, dark-brown, usually smooth outside, sometimes lenticellate. *Seeds* tan-brown, very light, winged at both ends, .5-.6 in. long including the wings.

Wood brick-red, soft, shining, open grained, fragrant, weighing about 35 lbs per c. ft. It seasons well and takes a good polish. It is much used for furniture and doors and windows. 8000-12000 seeds weigh 1 oz.

Flrs. 3-4. Fr. 5-7.

The above description applies to var. *typica*, which is fairly common throughout Assam, but less so than Var. *pilistaminea* C. D. C. Vern. *Jatipoma*, Ass., which is a smaller tree with smaller and more membranous longer-petioluled fewer leaflets, pilose filaments and shorter but stouter capsules often with minute lenticels. The bark exfoliates in regular papery flakes. The wood is less porous than of the type and weighs about 50 lbs. per c. ft.

Flrs. 1-2. Fr. 3-4.

Var. *multijuga* Kurz. *Khatmaiphang*, Cach.—*Branchlets*, rachis of leaves, petiolules and inflorescence permanently pubescent or puberulous, petiolules up to .6 in. long. *Filaments* glabrous, other characters as in Var. *typica*.

N. CACHAR HILLS.

Flrs. 3.

2. *Cedrela febrifuga* C. DC. Var. *assamensis* C. B. Cl. Vern. *Jati-poma*, *Phata-poma*, Ass.; *Kimbou-phang*, Kach.; *Inse-chang*, Naga; *Bol-bret*, Garo.

A middle sized tree up to 50 ft. in height; branchlets rather thick. *Bark* rough with vertical cracks, peeling off in oval flakes, .3 in. thick, red inside. *Leaves* paripinnate, 1.5-2.5 ft. long; common petiole terete, pubescent at least when young; leaflets up to 20 (?) mostly subopposite, 3-6 by 1-2.5 in., ovate-oblong, ovate or lanceolate, shortly caudate-accuminate, more or less rounded or subacute at the base, entire, rather membranous, concolorous on both surfaces, minutely puberulous along the

midrib and nerves or glabrate above, more or less pubescent along nerves beneath; lateral nerves 16-20 on either half, more transverse and less arched than in *C. Toona*; petiolule .15-.2 in. long, stout, puberulous. *Panicles* 16-20 in. long, narrower than in the preceding species, puberulous; pedicels velvety. *Flowers* small; buds almost globose. *Calyx* 5-toothed, hairy outside, margins ciliolate; petals obtuse at both ends, hairy specially along the middle on both surfaces, ciliate on the margins. *Filaments* and *Ovary* hairy. *Capsule* 1.5-2 in. long and up to .6 in. across, ovate-oblong, black, with large oblong brown warts outside. *Seeds* numerous, compressed, less than .25 in. long; upper wing .3 in., lower .7 in., long, tan-brown, membranous.

Occurs in evergreen forests of LAKHIMPUR and SIBSAGAR, e.g. Jeypur, Tippum, Deroi Reserve, Dikhari, etc.

Flrs. 7-9. Fr. 12-1.

Var. *Peali*, *C. DC.*—*Calyx* glabrous, rugulose outside; petals glabrous outside, sparingly pilose inside. *Capsule* unknown.

SIBSAGAR (G. E. Peal).

3. *Cedrela microcarpa* C. DC. Vern *Jati-poma* Ass.; *Khatmai-phang*, Cach.

A fairly large evergreen tree. *Bark* dark-brown, exfoliating in thin flakes, fibrous and uniformly red inside, turning yellowish-brown on exposure, aromatic, .5-.7 in. thick. *Leaves* 12-15 in. long; common petiole slender, terete; leaflets mostly alternate and then 9-15, (8-16 when opposite), 3-5 by 1-2 in. long, falcately lanceolate or ovate, caudate- acuminate, entire, membranous, glabrous and shining above; lateral nerves 8-12 on either side of the midrib, usually with a dense tuft of bristle-like brown hairs at the axils beneath; base oblique; petiolules .1-.4 in. long, slender, channelled. *Panicles* shorter than the leaves, ramifications somewhat zigzag and irregularly compressed, hairy. *Flowers* small. *Calyx* nearly glabrescent, ciliate, broad ovate or suborbicular, subacute or obtuse. *Petals* about .1 in. long, oblong, slightly hooded at the apex, glabrous, minutely ciliate on the margins; filaments densely pilose, connective apiculate. *Disk and ovary* densely hairy; style glabrous. *Capsules* .6-.8 in. long, dark-chocolate or black and verrucose outside. *Seeds* very light, .5-.6 in. long, winged at both extremities.

Rather rare, usually in hilly country ascending to 4000 ft.

The wood is finer-grained and less porous than, and used for the same purposes as, that of *C. Toona*. Weight about 36 lbs. per c. ft.

Flrs. during the rains (?). Fr. 11-1.

Cedrela Mannii*, C. DC. *Rachis* minutely puberulous. *Leaflets* 6 pairs ? opposite or subopposite, about 4.3 by 1.5 in., oblong or ovate-oblong, somewhat obtusely acuminate, entire, minutely puberulous on the midrib above, glabrous beneath; lateral nerves about 20 on either side; base oblique, usually rounded; petiolules very short. *Panicles* puberulous; pedicels short; calyx bluntly 5-toothed, ciliolate on the edges. *Petals* about .15 in. long, oblong, obtuse, margins ciliate; filaments densely pilose, connective of anthers not apiculate. *Disk and ovary* hirsute; style glabrous.

KHASI HILLS (Mann).

* Records of Bot. Survey of India Vol. III. P. 374-375.

FAM. 35. CHAILLETIACEÆ.

DICHAPETALACEÆ Engler.

Trees or shrubs. *Leaves* alternate, entire, simple; stipules 2, deciduous. *Flowers* small, 1-sexual or polygamous; *males* in axillary and terminal paniced cymes; *females* generally solitary on the axils of leaves with the peduncle often partly adnate to the petiole. *Sepals* 5, unequal, imbricate. *Petals* 5, free, equal or unequal, notched or 2-fid. *Stamens* 5, free or adnate to the petals; anthers oblong, introrse; connective often thickened at the back. *Disk* of 5 glands or scales inserted opposite the petals. *Ovary* free, 2-3 celled; ovules in collateral pairs, anatropous, pendulous from the apex of each cell. *Fruit* drupaceous, densely velvety-pubescent, compressed, with one pendulous seed in each cell. *Seed* with a large hilum and membranous testa; albumen 0; radicle superior; cotyledons thick.

1. DICHAPETALUM Dup. Thouars.

CHIALETTIA DC.

Dichapetalum gelonioides Engl. Syn. *Chailletia gelonioides* Bedd. *C. sumatrana* Micq. Vern. *Rokpoletak*. Miri & Abor; *Dingrali-arong*, Mik.

A small evergreen tree up to 40 ft. in height and 2.5 ft. in girth with spreading branches; young parts and inflorescence grey pubescent. *Bark* thin, greyish-brown, somewhat rough with lenticels, light-brown inside, turning yellow on exposure. *Leaves* bifarious, 2.5-6 by .8-2.5 in., elliptic to ovate-lanceolate, usually abruptly caudate-acuminate, chartaceous, narrowed to a very short petiole; lateral nerves generally 4-5 on either half, much arched, the lowest basal or sub-basal; tertiary nerves closely reticulate, more or less transverse; stipules 2-3 in. long, subulate, densely grey-hairy. *Flowers* polygamo-monœcious, in dense cymose clusters, generally paniced at the ends of branches of leaf axils; panicles up to 3 in. long; bracts and bracteoles small. *Male flrs.*—*Sepals* up to .1 in. long, unequal, united at the base, elliptic, subacute or obtuse, densely pubescent. *Petals* 5, about slightly longer than the sepals, linear oblong, deeply notched at the apex, adnate at the base to the sepals. *Stamens* inserted at the base of the calyx, nearly as long as the petals, connective broad. *Disk* of 5 quadrate scales. *Female flrs.*—As in the males but with sterile anthers; ovary broad, wooly; styles 2, recurved. *Drupe*

when perfect about .5 in. long, .7-.8 in., broad and .3-.4 in. thick, 2-lobed, transversely oblong or obcordate with two stones but sometimes only one carpel, perfect and thin, oblong and oblique with 1-stone, densely buff-felted outside; pericarp splits along the broader periphery exposing the orange-coloured thin mesocarp; endocarp rough, crustaceous; testa dark-red; cotyledons very fleshy, oily.

Evergreen forests of the N. E. F. DISTRICT, LAKHIMPUR and SIBSAGAR, not very common—Nizamghat, Borjan, Gaurisagar, Jamuguri; SYLHET, foot of the KHASI HILLS.

Wood light yellowish-brown, tough and hard, capable of being used for agricultural implements, tent-pegs, etc.

Flrs. 4-5. Fr. 11-1.

FAM. 36. OLACACEÆ.

Trees or shrubs, sometimes climbing, rarely undershrubs. *Leaves* usually alternate, simple, penni- or palmi-nerved; stipules 0. *Flowers* small, regular, cymose, bracteate, generally 2-sexual. *Calyx* usually small, of 4-5 teeth, sometimes reduced to a rim, rarely 0, often accrescent, valvate or imbricate. *Petals* 3-6, free or connate, valvate, rarely imbricate. *Stamens* 3-15; filaments free or adnate to the petals or fertile or some reduced to staminodes; anthers erect, 2-celled, introrse. *Ovary* free or adnate to the calyx, 1-celled or imperfectly 2-5 celled; style simple or 0; ovules 1-5, generally pendulous from the apex of a free central placenta. *Fruit* drupaceous, indehiscent, 1-celled, 1-seeded. *Seed* pendulous, albumen fleshy.

I. Calyx and corolla both present, the former accrescent:—

A. Bracts not connate, minute and caducous or

0. *Staminodes* 5:—

Generally erect shrubs, without tendrils.

Petiole less than .5 in. long.

Climbing shrubs with tendrils. Petiole 1-2 in. long

.. 1. *Olax*.

.. 2. *Erythralium*.

B. Bracts connate forming a persistent epicalyx.

Staminodes 0. Trees

.. 3. *Schœpfia*.

II. Perianth of one whorl of inflorescence supported by large broad (hop-like) bracts.

Staminodes 0. Small trees.

.. 4. *Lepionurus*.

1. OLAX Linn.

Trees or shrubs, sometimes climbing and spinescent, rarely undershrubs. *Leaves* alternate, often distichous, entire. *Flowers* in axillary short, simple or branched racemes. *Calyx* truncate or nearly so, enlarging in fruit. *Petals* 3-6, more or less coherent or free, valvate. *Fertile stamens* 3-5, usually 3, attached to the

base of the petals ; staminodes usually 5-6. *Ovary* free, usually seated in a cup-shaped disk, 1-celled above and more or less 3-celled below ; ovules 3, pendulous from the apex of a free central placenta ; style simple ; stigma 3-lobed. *Drupe* surrounded by the accrescent calyx ; stone crustaceous ; seed albuminous, embryo minute.

Shrub or a small tree ; leaves green beneath, acuminate at apex ; flowers in very short racemes. Undershrub with annual shoots, leaves glaucous beneath, obtuse at apex ; flowers usually solitary on slender peduncles.

.. 1. *O. acuminata*.

.. 2. *O. nana*.

1. *O lax acuminata Wall.** Vern. *Han-misang, Han-boka, Han-maljiangarong, Han-kanoj, Mik., Misen-baphang, Yao-laisaphang, Cach., Shamakubu, Mithi-phang-thing, Kuki ; Bol-narang, Moen, Garo ; Dieng-tyrut, Dieng-tilut, Khasi.*

A large shrub or small tree up to 16 ft. in height and a foot in girth ; branches dark-green, smooth and with shallow but long longitudinal fissures ; bark thin, greenish-white inside ; branchlets angular. *Leaves* 2-4 by '6-1'5 in., elliptic or oblong lanceolate, acute or acuminate, entire, membranous, glabrous, shining above, pale beneath, giving a foetid smell when bruised ; main lateral nerves 7-10 on either side of the midrib, very slender, more or less anastomosing at the outer extremities to form an uneven intramarginal nerve ; petiole about '1 in. long, margined. *Inflorescence* axillary, scarcely exceeding '3 in., 3-7 flowered, solitary or fascicled ; bracteoles ovate, minute, caducous ; buds elliptic-ovoid. *Flowers* white, '15-'2 in. long ; pedicels ascending, short. *Calyx* very small, salver-shaped, almost imperfectly 3-toothed, accrescent in fruit. *Petals* 3, oblong, valvate, each bearing at the base one short fertile stamen along the middle and two long staminodes, one on either side of the stamen ; anthers 2-celled, adnate, oblong. *Style* simple. *Drupe* '65 in. long by '5 in. diam., ellipsoid or ovoid-oblong, seated inside the cup-shaped accrescent calyx, orange-red when fully ripe ; stone 1-celled, 1-seeded.

Round the base of the Mikir Hills from the Doyang Reserve, SIBSAGAR on the east to the Kholahat Reserve, NOWGONG, on the west. Distribution the N. C. HILLS, SYLHET, CACHAR, Bijni Reserve in GOALPARA, the GARO HILLS, KHASI & JAINTIA HILLS up to about 2500 ft.

Wood cream coloured, tough and close-grained. The Mikirs eat the leaves cooked, especially with fish and meat.

Flrs. 4-5. Fr. 5-7.

2. *O lax nana* Wall.

A switchy undershrub about 2 ft., high, stems striate. *Leaves* subsessile, 1-2'7 by '3-'6 in., narrowly oblong-lanceolate or ovate-

* M. T. Masters in the Fl. Br. Ind. suspects *O lax acuminata* Wall, to be, and Mr. Gamble has described it as a climbing shrub. But the plant as described above has no climbing tendency. It can hardly be *O. zeylanica* Linn., which has 5 petalous flowers. If it is not *O. acuminata* Wall, can it be a new species ?

lanceolate, obtuse at the apex, entire. margins often recurved. glabrous above, glaucous beneath; lateral nerves indistinct. *Flowers* white, about .25 in. long, solitary, on slender axillary peduncles up to .5 in. long; buds clavate, oblong. *Petals* 3, oblong, obtuse at the apex, cohering towards the base. *Fertile stamens* 3, opposite the centre of the petals; staminodes 6, one on each edge of the petals, bifid. *Drupe* subglobose, .25 in. long, nearly covered by the accrescent scarlet calyx.

Foot of KHASI HILLS (record based on incomplete material), ASSAM—Fisher (!) LOWER ASSAM—Gustav Mann (!), grass land near Raimona, GOALPARA DISTRICT—C. Purkayastha. Among grass in drier districts.

The fruits are edible but they are insipid.

Flrs. 3-5. Shoots are annually produced from a woody rootstock.

2. ERYTHROPALUM Bl.

Climbing shrubs with axillary tendrils. *Leaves* alternate, simple, palminerved at the base. *Inflorescence* axillary, dichotomous, ebracteate. *Flowers* very small. *Calyx* 4-5 lobed, adherent to the ovary, accrescent. *Petals* 5, valvate, combined into a campanulate corolla. *Stamens* 5, opposite the petals and inserted on them; filaments very short; anthers adnate, incurved; connective thick. *Staminodes* 5, inserted with the stamens on the petals and alternating with them. *Ovary* conical, half immersed in the disk, 1-celled; style simple, short; ovules 1-3, naked. *Fruit* indehiscent, crowned by the tips of the enlarged calyx-lobes. Seed 1, pendulous; embryo minute; albumen fleshy.

Leaves subcoriaceous. Ripe fruit whitish, smooth. ...

1. *E. Vagum*.

Leaves membranous. Ripe fruit yellowish, rough. ...

2. *E. scandens*.

1. *Erythropalum vagum* Mast. Vern. *Lojangthu*, Mik.

A rambling climber with whitish stem. *Leaves* 4-6 by 1.7-4 in., ovate oblong, acute or acuminate or obtuse, subcoriaceous, shining above, glaucous beneath, subpeltate, usually 5-nerved at the base with 3 or 4 lateral nerves on either side of the median nerve; base truncate or subacute; petiole 1-2 in. long, terete. *Inflorescence* 8-10 in. long, laxly branched; peduncles 5-7 in. long, slender, terete. *Calyx* obscurely 5-lobed. *Corolla-lobes* oblong-ovate, reflexed. *Filaments* very slender. *Ovary* 1-celled with a large 5-lobed disk on the top; ovules 3, pendulous. *Fruit* .6-1 by 4-6 in., ellipsoid or ovoid-oblong whitish, narrowed at the base to a stipe, spongy inside. *Seed* solitary, large, naked.

Fairly common along the foot of the NAGA HILLS and MIKIR HILLS, c. g. Merapani, Kalioni, Garampani, etc.

Flrs. Rainy season, Fr. cold weather.

2. *Erythropalum scandens* Bl.

Closely resembling the foregoing species and hardly a distinct species. The *leaves* are ovate to ovate lanceolate, thinner, pale beneath, generally 3-nerved at the base, often subcordate; *inflorescence* shorter, fruit yellowish when ripe, not so smooth outside as of the other species.

Western half of the SIBSAGAR DISTRICT.

Distribution KHASI HILLS along its southern slopes, ascending to 2500 ft., Hat Mawdan, Syndai, etc.

Fls. Rainy season. Fr. cold weather.

3. SCHŒPFIA Schreb.

Schœpfia fragrans Wall. Vern. *Soh-kymphurkhlaw*, *Dieng-khao-khorai*, Khasi; *Dieng-shleng-khlaw*, Khasi (Mairang); *Dieng-sarumi*, Synt.; *Dieng-sa-niriang-blai*, Synt. (Raliang).

A small evergreen tree up to about 40 ft. in height and 1 ft in girth; branchlets angular. *Bark* pale-brown or grey, corky, closely but not deeply reticulate, with fine horizontal fissures, .2-.6 in. apart; inside pale-brown, turning deeper brown on exposure. *Leaves* 2-3.5 by .5-1 in., lanceolate, acuminate, with entire and slightly revolute margins, thinly coriaceous, glabrous; lateral nerves indistinct, about 5-7 on either side of the midrib; tertiaries laxly reticulate; petiole .2-.3 in. long, margined. *Racemes* axillary, up to about an inch long, usually 3-6, sometimes 9 flowered; buds ellipsoid-oblong; pedicels slender, .2-.3 in. long. *Flowers* yellowish-white, exquisitely fragrant, .4-.5 in. long, each supported by an epicalyx of 3 ciliate bracts, connate into a cup. *Calyx* obconic in flower, with a truncate or obsoletely 4-5 lobed margin, accrescent in fruit and remaining attached to it. *Petals* usually 5, combined up to about three-fourths of their length, free portion valvate in bud; tips slightly hooded and with a tuft of hairs inside about the middle and behind the anthers. *Stamens* included; filaments adnate to the petals nearly their whole length. *Ovary* half superior, 1-celled above, 3-celled beneath, surmounted by a fleshy conical lobed disk; style glabrous; stigma with 3 globular lobes. *Fruit* a 1-celled 1-seeded drupe, .5-.6 in. long, ellipsoid, supported by the epicalyx and covered up to the top with the accrescent calyx, white and succulent when ripe, stone thin-walled, striated; seed white, conforming with the stone; embryo minute at the apex of the fleshy albumen.

Jaipur, LAKHIMPUR, but likely to occur in similar localities in UPPER ASSAM; KHASI HILLS, 3-6000 ft.

Wood pale-white with close soft wavy bands of softer tissue, weighing 33 lbs. per c. ft., not used for timber.

Fls. 9-1. Fr. 2-4.

Schœpfia acuminata Wall. A small tree. *Leaves* 1.5-3.5 by .8-1.7 in., elliptic acuminate; lateral nerves very slender, 3-5 on either half, tertiaries not visible; petiole flattened, .15-.2 in. long. *Raceme* about 1 in.; pedicels stiff, .2-.3 in. *Flowers* .6 in. long. *Corolla* tubular campanulate, lobes ovate. *Stamens* and *ovary* as in *S. fragrans*.

Very doubtfully different from *S. fragrans*. The difference is supposed to consist in its broader leaves, shorter pedicels and larger flowers. The only difference I am able to make out is a slight one, in the venation of leaves, which would not entitle it to specific rank.

Only one sheet from Mismi country collected by Griffith in Sibpur herbarium, KHASI HILLS about 6000 ft. Laitkor (My sheet No. 7222)?

Flrs. 7-9. Fr. 10-12.

4. LEPIONURUS Bl.

Lepionurus sylvestris Bl. Syn. *L. oblongifolius* Mast. Vern. *Impai-kelok*, Mik.

A large shrub or small tree with grey bark and long switchy green branches, somewhat lanky in habit. *Leaves* alternate, 4-7 by 1·2-3 in., oblong-lanceolate to elliptic or obovate, acute or acuminate, entire, membranous, glabrous, covered on both surfaces with numerous raised pustules; lateral nerves 6-9 on either side of the midrib, slender, arched; base acute; petiole 1·2 in. long, margined. *Flowers* greenish, faintly scented, 2-sexual, about 0·7 in. diam., tetramerous, in umbel-like groups of 3-9 on small bracteate protuberances on the rachis of fascicled, axillary or slightly supra-axillary slender racemes, 1-2·5 in. long, ovate, membranous, ciliate. *Calyx* 0. *Perianth* urceolate, 4-lobed; lobes ovate, subvalvate, velvety outside. *Stamens* 4, opposite the perianth lobes; anthers subsessile. *Staminodes* 0. *Disk* fleshy, lining the base of the perianth-tube. *Ovary* free; 1-celled; stigma sessile. *Fruit* a 1-seeded glabrous drupe, 5 in. long by 2·5 in. across. *Seed* pendulous; cotyledons ternate.

In damper parts of evergreen forests in the N. E. F. DISTRICT, LAKHIMPUR, SIBSAGAR and DARRANG, N. C. and KHASI HILLS.

Flrs. generally 3-4, occasionally in October. Fr. rainy season.

Anacolosa illicoides Mast.—A small tree, branchlet pale white. *Leaves* 1·5-6 by 6-2 in., elliptic or oblong elliptic, acute at both ends, lateral nerves 6-8 on either side, slender; petioles 2-4 in. long. *Flowers* small, about 0·8 in. diameter, 2-6 (?) together in lax umbellate peduncled cymes; peduncles axillary, half the length of petioles. *Calyx* cup-shaped, glabrous, 5-6 toothed. *Petals* 5-6, much exceeding the calyx, oblong, concave at the base, inserted with the stamens on the disk. *Stamens* slightly adnate to the petals, opposite and concealed by them, filaments broad, glabrous. *Ovary* imperfectly 3-celled, depressed, conic; ovules 3.

Only one sheet from KHASI HILLS in Sibpur herbarium, collected by Wallich. Purkayastha has made further collection in 1935 from Umsaw K. & J. Hills.

Fam. 37 ICACINACEÆ.

Trees or shrubs, the latter sometimes climbing. *Leaves* generally alternate, simple; stipules 0. *Flowers* small, 2-sexual, polygamous or dioecious, in corymbose cymes, racemes or heads. *Calyx* small and 5- (rarely 4- or 6) lobed or partite or wanting. *Petals* or perianth segments 5, rarely 4 or 6, free or connate. *Stamens* isomerous and generally alternate with the petals or perianth-segments, in female flowers reduced to staminodes. *Ovary* generally 1-celled, occasionally 2-celled, with 1-2 ovules, pendulous from the apex of each cell. *Fruit* a 1-seeded drupe.

- I. Trees or shrubs generally erect :—
 A. Flowers 2-sexual, petals free :—
 Petals glabrous within, ovary oblique. .. 1. *Apodytes*.
 Petals villous within, ovary straight. .. 2. *Mappia*.
 B. Flowers polygamous diœcious, petals connate. .. 3. *Gomphandra*.
 II. Climbers. Flrs. diœcious :—
 A. Leaves alternate. Stamens alternate with the petals :—
 Flowers in heads, calyx 0. .. 4. *Miquelia*.
 Flowers in supra-axillary racemes, calyx present. .. 5. *Nastiatum*.
 B. Leaves opposite or nearly so, stamens opposite the petals. Flrs. in cymes ; calyx persistent. .. 6. *Iodes*.

1. APODYTES Meyer.

Apodytes Benthamina Wight. Vern. *Dieng-sormi*, Synt. ; *Dieng-lapitri-jem*, Khasi.

A handsome tree with a clean cylindrical trunk, up to 80 ft. in height and 5 ft. in girth ; young shoots pubescent. *Bark* outside with warts, 5-7 in. thick, light brown, mattedly fibrous and granular inside with a few faint streaks of whitish tissue, turning to chocolate brown on exposure, exuding a colourless watery sap from the cambium. *Leaves* alternate, 2·5-4·5 by 1-2 in., elliptic-oblong to oblong-ovate or lanceolate, acute, subacute or shortly acuminate, sometimes with blunt tip, margins revolute, thinly coriaceous, glabrous, often slightly puberulous along the midrib above, somewhat unequal at the base, turning black in drying ; main laterel nerves 4-7 on either half with 1-2 intermediate ones between each couple, arched, slender ; tertiaries very lax, inconspicuous ; base acute or obtuse ; petiole 5-1 in. long, finely channelled, puberulous. *Inflorescence* a terminal corymbose panicle, 3-5 in. long and almost as broad ; branches and pedicels buff puberulous ; pedicels short ; buds oblong. *Flowers* white, sweet scented. 2-sexual. *Calyx* very small, salver-shaped, hirsute, 5-toothed. *Petals* 5, valvate, about 16 in. long, oblong, rather fleshy, inflexed at the tip, quite free, glabrous. *Stamens* 5, alternating with the petals ; filaments inserted below the ovary, slightly dilated downwards, glabrous ; anthers sagittate, dorsifixed, slightly puberulous, dehiscing longitudinally. *Ovary* hairy, 1-celled, with two superposed pendulous ovules ; style 1, persistent, slightly excentric in flower, but gradually pushed downwards as the fruit develops, ultimately forming a beak near the base of the mature fruit. *Fruit* a compressed drupe, 3 by 25 in., obovoid, longitudinally striated, hirsute, furnished with a lateral orbicular shield-like appendage which goes on growing as the fruit develops and turns deep reddish-brown in ripe fruit. *Seed* 1, conforming with the fruit, albuminous.*

* My specimens of this tree have been identified at Sibpur as *A. Benthamina*, but the above description does not quite agree with that given for that species in Fl. Br. Ind. It may turn out to be a new species or at least a variety peculiar to Assam.

Dhansiri Reserve, NOWGONG, N. CACHAR HILLS and KHASI and JAINTHIA HILLS up to 4000 ft.

Wood deep tan brown weighing 45 lbs. per c. ft., fine grained, polishes well, medullary rays of two kinds, very fine with a few slightly thicker, joined by many fine transverse bars. The leaves emit a bad smell when bruised.

Flrs. 4-5. Fr. 9-1.

2. *MAPPIA* Jacq.

Mappia foetida Miers.

Generally a tree with a strong smell, which when old shows a climbing tendency and splits into numerous separate stems. *Bark* greenish-grey, wrinkled; young shoots pubescent. *Leaves* alternate or subopposite, 2-8 by 1-3 in., ovate or elliptic, acute or acuminate, entire, sub-coriaceous, at first thinly pubescent, especially underneath afterwards glabrescent; lateral nerves 4-7 on either side of the midrib, the lowest basal or sub-basal, much arched, tertiaries transverse; base more or less rounded or subacute; petiole 1-2 in. long, channelled, puberulous. *Flowers* small, yellow, with an unpleasant smell, in terminal corymbose panicles; pedicels short, strigose. *Calyx* minute, 5-lobed, hairy. *Petals* 5, villous within. *Stamens* 5, hypogynous, cup-shaped. *Ovary* hairy, 1-celled; ovules 2, pendulous; style terminal. *Fruit* an oblong drupe up to .75 in. in length; seed solitary, pendulous, albuminous; radicle superior.

Only once found near Borjan, Makum Range, Dist. LAKHIMPUR. Distribution MYSORE and the NILGIRIS.

Wood soft and porous.

Flrs. 3-7.

3. *GOMPHANDRA* Wall.

Gomphandra axillaris Wall.

A large shrub or small tree with glabrous twigs, buds pubescent. *Leaves* alternate, 2-farious, 3-7 by .5-2.5 in., oblong or lanceolate, acuminate, often abruptly thinly subcoriaceous, glabrous on both surfaces, paler beneath; lateral nerves 7-9 on either half, slender, raised beneath, oblique, specially the sub-basal pair, tertiaries more or less transverse and subparallel, specially towards the margin, nervules laxly reticulate; base rounded or narrowed; petiole .2-5 in. long, stout, channelled. *Flowers* small, unisexual or polygamous in puberulous axillary or extra-axillary paniculate, few flowered cymes up to .4 in. long. *Calyx* minute, cup-shaped, 4-5 toothed. *Petals* about .15 in. long, inserted on a short hypogynous disk and connate into a tubular campanulate corolla, much exceeding the calyx lobes, ovate, inflexed at the tip, ultimately spreading. *Stamens* 5, alternating with the petals; filaments thick, flat on the back and hollowed near the top in the front to receive the anthers, pilose with glandular hairs at the apex, which exceed the anthers; anthers pendulous from the apex of the filament.

Ovary rudimentary in the male and oblong and obtusely 4-5 gonous in the female flr., 1-celled; stigma discoid*. *Fruit* drupaceous, '5-'6 in. long, oblong, crowned by the remains of the stigma. *Seed* large, striated outside.

Nongkila-KHASI & JAINTIA HILLS, Balijan, Tengalibam, Prains collector (!)
LUSHAI-Præzer (!) Gauhati-Jenkins (!).
Flrs. 5-7. Fr. 10-12.

4. MIQUELIA Meissn.

Miquelia Kleinii Meissn.

A fairly large harsh climber with corky bark and very large wood vessels. *Leaves* alternate, 5-9 by 1·5 in., elliptic oblong or lanceolate, abruptly acuminate, generally entire, membranous or thinly coriaceous, strigose when young; main lateral nerves 7-12 on either side of the midrib, arcuate, the lowest from near the base; petiole 1·5-2 in. long. *Flowers* greenish in pubescent heads, diœcious. *Perianth* supported by a 3-5 cleft involucre. MALE FLOWER HEADS 15-20 flowered; peduncles 1-2 in. long, filiform, racemosely disposed on a short supra-axillary protuberance. *Perianth* separated from the involucre by a pedicel, up to '15 in. long, puberulous outside, 4-5 lobed, lobes elliptic valvate, equalling or slightly shorter than the tube. *Filaments* very short; anthers oblong. FEMALE FLOWER HEADS about 10-15-flowered; peduncles solitary, about '5 in. long, thick, involucre persistent. *Perianth-tube* short or 0, lobes reflexed. *Staminodes* minute. *Ovary* ovoid; stigma sessile, 4-lobed. *Fruit* a compressed drupe, '5-'6 by '3 by '2 in., tubercled outside, 1-seeded, putamen pitted; albumen copious; radicle superior; cotyledons flat, leafy, as broad as the seed.

Dikrang in LAKHIMPUR, Joboka, Mohmara, Dumardalang in SIBSAGAR, Charduar in DARRANG, KHASI HILLS. Not very common.
The thin flexible shoots are used for binding purposes.

Flrs. 4-5. Fr. 10-11.

5. NATSIATUM Ham.

Natsiatum herpeticum Ham. Vern. *Target-riube*, Miri.

A semi-herbaceous climbing shrub with tuberous roots and harsh stem, shoots densely strigose; wood very porous. *Leaves* alternate, 3-6 by 2-5 in., broadly ovate, acute or acuminate, repand or dentate, membranous, scabrid with adpressed stiff white hairs, palmately 7-9 nerved at the base, each main nerve giving off 1-2 lateral ones; base truncate or abruptly cuneate; petiole 2-6 in. long, very strigose. *Flowers* greenish-yellow, diœcious, bracteate, in supra-axillary hirsute, slender, spiciform racemes up

* The discoid stigma on the top of the ovary is regarded by some to be in reality on accrescent epigynous disk concealing the true style and stigma—F. B. I.

to 4·5 in. long ; bracts linear ; pedicels up to 1·5 in. *Calyx lobes* valvate, linear-lanceolate, shaggy outside with coarse hairs. *Petals* 5, up to 1 in. long, alternating with calyx-lobes and slightly longer than them, lanceolate, hairy. *Fertile stamens* opposite the calyx-lobes ; filaments short ; anthers bright-yellow, sagittate. *Staminodes* (in female flowers) subulate. *Ovary* 1-celled, hairy ; style 2-3 fid. *Fruit* a compressed ovate drupe, somewhat oblique and tapering, 3 by 2·5 by 2 in., rugose ; stone crustaceous ; seed solitary ; albumen fleshy ; cotyledons leafy.

Along the Buri-suti in the N. E. FRONTIER DISTRICT, the Mikir Hills Namchang (foot of the NAGA HILLS), LAKHIMPUR, SIBSAGAR, GOALPARA, SYLHET and foot of the KHASI HILLS.

The leaves and tender shoots are eaten by the Miris cooked as a pot herb, especially with fish.

Flrs. 12-1. Fr. 1-2.

6. IODES Bl.

Iodes Hookeriana Baill.

A fairly large climbing shrub ; young stems covered with soft bristles, old with corky warts. *Leaves* opposite or subopposite, 4-8 by 1·5-3·5 in., oblong-ovate or obovate, abruptly acuminate, entire, subcoriaceous, glabrous above, pilose beneath along the nerves, strongly and closely reticulate ; lateral nerves 7-9 on either half, very prominent beneath ; base rounded or shallowly cordate ; petiole 3-7 in. long, shaggy with brown bristles. *Inflorescence* extra-axillary, cymose, the lower peduncles often reduced to tendrils. *Flowers* dioecious. *Calyx* minute, salver-shaped, with 5 short deltoid lobes. *Petals* 5, valvate, oblong, thick, free in the male flower, combined and tubular in the female, hairy outside at the base. *Stamens* 5, hypogynous, opposite the petals or corolla-lobes and shorter than them ; filaments glabrous ; anthers sagittate. *Ovary* 1-celled with 2 pendulous ovules ; style 0 ; stigma 5-lobed. *Fruit* a drupe of the size and shape of a large almond, supported by the persistent calyx, orange-red when ripe ; seed solitary, ovate ; albumen fleshy ; cotyledons flat, leafy.

Barpathar, SIBSAGAR ; also pabhoi, DARRANG and KHASI HILLS (Hooker).
Flrs. cold season. Fr. 7-9.

***Cardiopteris lobata* R. Br.**—is a curious climbing herb of doubtful affinity with a milky juice found in forest glades in SIBSAGAR, and possibly elsewhere. The *leaves* are deciduous, polymorphous, generally palmately 7-9 nerved at the base, membranous, long-petioled. The fruit is surrounded by a thin, shining, silky obovate obcordate wing which is about 1 in. long and 75 in. broad. Vern. *Lalruna-buphai-thup*, Lushai.

FAM. 38. AQUIFOLIACEÆ (ILICINÆ).

Trees or shrubs generally evergreen. *Leaves* alternate, simple, glabrous, usually coriaceous ; stipules 2, minute or 0. *Flower* regular, usually diœcious, sometimes bisexual, small, in axillary fascicles, umbels or congested cymes. *Calyx* 3-6 cleft or lobed ; segments or lobes imbricate, persistent. *Petals* 4-5, rarely 6-8 or more or less connate in the male flowers, imbricate, deciduous. *Stamens* 4-5, adnate to the petals or free and hypogynous (imperfect) in female flowers. *Disk* 0. *Ovary* free, (rudimentary in male flowers), 3-16 celled ; style short ; ovules 1-2, pendulous. *Fruit* a drupe with 2 or more 1-seeded stones ; seed with a membranous testa ; embryo minute.

ILEX Linn.

The characters of the family.

Blaze oxidizes rapidly on exposure.

I. Leaves quite entire, flowers in umbellules :—

A. Flowers unisexual :—

- a. Umbellules often arranged racemosely, peduncles '3-'8 in. long. Flowers 4-5 merous. Lofty tree ; branchlets pubescent, leaves thinly coriaceous. .. 1. *I. Godajam.*
- b. Umbellules solitary, peduncles '5-1 in. long. Flowers 4-5 merous ; middle-sized trees, branchlets glabrous, leaves membranous. .. 2. *I. sulcata.*
- c. Umbellules cymose, solitary or crowded on a short rachis ; peduncles '3-'6 in. long. Flowers 4-6 merous. Moderate sized tree, branchlets green, glabrous ; leaves thickly coriaceous. .. 3. *I. venulosa.*

B. Flowers bisexual :—

Umbellules mostly solitary, sometimes several on short shoots. Flowers 4-merous. .. 4. *I. Doniana.*

II. Leaves serrate or serrulate :—

1. Leaves not gland dotted :—

a. Fem. flrs. fascicled :—

Male flowers in dense corymbose cymes, branched from near the base. Flowers 4-5 merous. .. 5. *I. theæfolia.*

Male flrs. in peduncled umbellules, peduncles '2-'5 in. long. Flowers 4-merous. .. 6. *I. embelioides.*

Male flrs. fascicled. Flowers often more than 5-merous. Leaves membranous, strongly reticulate beneath. .. 7. *I. fragilis.*

b. Fem. flrs. solitary :—

Male flrs. on peduncled umbellules, peduncles '5-1 in. long. Flrs. 4-merous. .. 8. *I. Griffithii.*

2. Leaves dotted with raised dark glands beneath :—

Fem. flrs. mostly solitary. Flrs. 4-merous. .. 9. *I. Thomsonii.*

1. *Ilex Godajam* Coleb. Vern. *Hati-kerepa*, Ass. (Sib.) ; *Born-bokul*, Ass. (Larr.) ; *Theng-tuni*, *Theng-sang-proth-arong*, Mik. ; *Theny-ngoithel*, Tipp.

A large deciduous tree with spreading branches attaining often over 100 ft. in height and 8 or 9 ft. in girth ; young shoots and inflorescence pubescent. *Bark* grey, plain, excepting for warts and fine close horizontal wrinkles ; inside granular or mealy, at first light brown, but soon turning dark-brown or black. *Leaves* 3-5 by 2-2.5 in., ovate elliptic or oblong, generally bluntly short acuminate, entire, often undulate, thinly coriaceous, glabrous and shining above, pale beneath ; mid-rib and main lateral nerves often thinly pubescent beneath when young ; lateral nerves 8-10 on either half, slender, arched ; base generally acute ; petiole .5-1 in., puberulous or glabrescent, channelled ; stipules minute. *Flowers* about .15 in. diam., 4-5 merous, pale, fragrant ; male flowers in simple or paniced, pedunculate umbels ; panicles up to 2 in. ; peduncles .3-.8 in. long, pedicels slender up to about .1 in. long. *Calyx-lobes* orbicular, more or less ciliate. *Petals* broadly obovate or ovate oblong, slightly united at the base about .1 in. long. *Filaments* very slender, exceeding the petals. *Fruit* ovoid, about .1 in. across, sulcate, with 4-6 stones.

Along the foot of the MIKIR HILLS from Amguri in NOWGONG to Barpathar in SIBSAGAR, SYLHET, GARO HILLS and N. CACHAR HILLS.

Wood of a dull pale colour weighing about 40 lbs. per c. ft., not used except as firewood.

Flrs. 2-4. Fr. 4-6.

2. *Ilex sulcata* Wall. Vern. *Bikha-kulia*, Ass. (Darr.) *Kotoki*, Ass. (Kam.) ; *Cheknan*, *theng-pisuni*, Mik. ; *Bol-thajong*, *Bol-mikachhak*, Garo ; *Dieng-jali*, Khasi.

Usually a middle-sized deciduous tree, but sometimes as large as the preceding species, very young branchlets thinly pubescent. *Bark* greyish-white outside ; plain or with shallow horizontal wrinkles ; blaze greenish next to the cuticle, deeper layers cream-coloured, pinkish near the cambium, but all soon turning black on exposure, soft, granular. *Leaves* elliptic, elliptic-oblong or ovate, 2.5-5.5 by 1.3-2.5 in., somewhat abruptly acuminate, quite entire and with a thin translucent margin, membranous, glabrous, pale beneath ; lateral nerves 8-12 on either half, very slender, somewhat irregular, anastomosing into loops at the extremities ; tertiaries very scanty, laxly reticulate ; base acute ; petiole .4-.8 in. long, margined, puberulous when young. Umbels 12-20 flowered, generally solitary below the leaves on leaf-bearing branchlets ; peduncles .6-1 in. long, compressed towards the apex ; pedicels about .1 in. long, both more or less puberulous. *Calyx-lobes* orbicular, pubescent outside. *Petals* 4-5 in the male flowers, up to 6 in the female, orbicular or broadly oblong, glabrous. *Filaments* slightly longer than the petals, glabrous. *Drupe* .2 in. across, globose ; stones up to 8, trigonous.

NOWGONG and DARRANG generally in deciduous forests, KAMRUP—Mann (!), low elevations in KHASI HILLS and GARO HILLS.

Wood white, compact and very fine-grained; pores very small and scanty. Weight about 50 lbs. per c. ft. capable of being used for scabbards, platters and toys.

Flrs. 3-4. Fr. 5-6.

3. Ilex venulosa Hk. f. Vern. *Dieng-lalih*, *Dieng-soh-saw*, Khasi.

A moderate-sized tree with green glabrous branchlets covered usually with large lenticels. Bark grey, fairly smooth, lenticellate; blaze greenish-white, turning brownish, edges (layers below the dead tissue) green. Leaves 3-7.5 by 1.2-2.5 in., oblong or elliptic-oblong, usually abruptly caudate, quite entire, glabrous, brownish-red when young, coriaceous, midrib prominent beneath; lateral nerves strong, 10-14 on either half, arcuate towards the free end, anastomosing into loops near the margin, nervules laxly reticulate; petioles .5-1.2 in. long, stout, channelled. Flowers whitish, about .1 in. across, polygamous, 4-6 merous; male flowers in slender cymose umbellules, usually branched from a rachis up to 1 in. long; female flowers in axillary peduncled umbellules, either solitary or crowded on a short rachis up to 1 in. long; peduncles .3-.6 in. long, stouter than in male flowers; pedicels up to .15 in. Calyx broad ovate, obtuse. Petals oblong or obovate, combined at the base in both sexes. Stamens inserted between them at the base. Stigma large discoid, subsessile. Drupe globose, red when ripe, .15 in. across, stones 4-6.

KHASI HILLS, 4000-5500 ft.

Flrs. 4. Fr. 11.

4. Ilex Doniana DC. Syn. *Ilex excelsa* Wall. Vern. *Dieng-soh-syrtet*, *Dieng-soh-tyrlang*, *Dieng-lali*, *Dieng-soh-lali*, Kh.; *Dieng-lihsyrang*, Synt. *Bol-ai*, Garo.

A small or medium sized tree; young shoots pubescent or nearly glabrous beneath, often stout. Bark light to dark-grey with horizontal wrinkles and covered with lenticular warts, otherwise smooth, blaze cheesy pale-dun or yellowish white, darkening and turning, rather dirty brown to almost black on exposure. Leaves 2-3.5 by 1.25-1.75 in. ovate, elliptic or elliptic-oblong, acuminate in some forms, entire, subacute, thin or subcoriaceous when mature, glabrous, dark-green and shining above, glabrous or pubescent beneath; lateral nerves 6-9 on either half, slender, arcuate, anastomosing near the margin; petiole .3-1 in. long, slightly channelled, puberulous or glabrescent. Flowers 2-sexual, 4-5 merous, .15 in. across in axillary pubescent peduncled umbels, sometimes in short panicles; peduncles .2-.5 in. long, stout, up to 15 flowered; pedicels about .1 in. long. Calyx-lobes broad ovate to rounded, more or less hirsute outside at least when young, ciliate. Petals suborbicular-oblong or obovate, united at the base. Stamens alternating with the petals and inserted

at their base. *Drupe* '2 in. across, globose, bright red with 4-5 trigonous stones.

KHASI & JAINTIA HILLS generally above 3000 ft., N. CACHAR HILLS about 1600 ft., GARO HILLS-Dambu Reserve.

Wood brownish or greyish white, medullary rays broad with very fine ones between, pores small; takes a fine polish—not used.

Flrs. 3-4. Fr. 11-12.

The following forms may be mentioned.

Form 1. young shoots and undersurface of leaves at least along the midrib pubescent. Leaves often elliptic oblong and generally with subacute tip, umbels often in short panicles.

GARO HILLS. NORTH CACHAR; Jowai—KHASI HILLS etc.

Form 2. Branchlets stout, usually glabrous. *Leaves* entirely glabrous, sub coriaceous, broader than in the last, acuminate; lateral nerves somewhat distant, usually not more than 6, umbels never paniced.

KHASI HILLS between 4000 & 6000 ft.

5. *Ilex theæfolia* Hk. f. Vern. *Dieng-soh-tyrlong-kynti*, *Dieng-shieng*, Khasi.

A moderate-sized to small tree; young parts and inflorescence puberulous. *Bark* grey, lenticelled, thin; blaze pale-brown with white streaks, granular. *Leaves* 1'5-3 by '6-1'4 in., elliptic-oblong, lanceolate or oblong-lanceolate, shortly caudate acuminate, serrate or serrulate, coriaceous, shining above; lateral nerves 7-9 on either half, anastomosing near the margin, slender, not prominent; base acute, cuneate or narrowed and obtuse; petiole up to '3 in. long, slightly margined, channelled. *Flowers* whitish, 4-5 merous, about '2 in. across, male flowers in dense axillary corymbose cymes branched from the base, up to '5 in. long; pedicels slender up to about '2 in. long, female flowers fascicled or crowded on short axillary protuberances or branches; pedicels stouter than in male flrs.; about '2 in. long. *Calyx* broad ovate, subacute, round, ciliolate. *Petals* broadly obovate or obovate-oblong, connate at the base in male, free in female flrs. *Stamens* longer than the petals in male flowers; staminodes in female flrs shorter than the petals. *Drupe* globose about '2 in. across, reddish-brown when ripe; stones 3-4.

KHASI HILLS 4000-6000 ft.

Flrs. 4-6 ? Fr. 7 ?

6. *Ilex embelioides* Hk. f. et Thom.

A small tree. *Bark* thin, greenish-grey, nearly smooth, distantly warty and with faint horizontal wrinkles; blaze dull greenish white, turning dirty on exposure, granular; shoots and inflorescence finely puberulous. *Leaves* 2-farious, deep green, 1'2-2'5 by '5-8 in., elliptic to oblong-lanceolate, caudate with a blunt apiculate tip, with few distant spinous teeth or nearly entire, shining above, finely puberulous along midrib on both surfaces, ultimately glabrous; base acute or cuneate; petiole channelled up to '25 in. long. *Flowers* 4-merous, white, about '1 in. across. *Males* in peduncled umbellules, clustered at the ends of branches or leaf axils, often on very short branches, sometimes solitary; peduncles

of umbellules '2-5 in. long; pedicels slender, short; buds globose. *Female* flowers in fascicles at the leaf axils often on very short branches. *Calyx* lobes puberulous outside, broad, subacute or obtuse, ciliate. *Petals* suborbicular, ovate or oblong, cuneate at the base in both sexes. *Stamens* nearly as long as the petals, inserted at their base and alternating with them. *Pistillode* in male flower globose. *Drupe* globose, '15-2 in. across, with 1-3 stones.

KHASI HILLS 4000-6000 ft.

Flrs. 4-5. Fr. 10.

7. *Ilex fragilis* Hk. f. Vern. *Dieng-lali-iong*, Khasi.

A small tree, with fragile branches and greyish-white warty bark; blaze pale yellow, turning blackish on exposure. *Leaves* 2-3.5 by 1-2.2 in., elliptic or ovate, acuminate, serrate or serrulate, teeth generally apiculate, membranous, glabrous, midrib and main lateral nerves prominent beneath, the latter 6-9 on either half, tertiaries distant, more or less transverse and raised; forming large strong reticulations with the lateral nerves, nervules fine; base cuneate to rounded; petiole winged up to '25 in. long. *Flowers* white, up to about '15 in. across; both males and females fascicled, often from short peduncles; pedicels up to '2 in. long. *Calyx* lobes 5-8, rounded, somewhat unequal, ciliate. *Petals* 5-8, combined at the base in both sexes, suborbicular or broad-oblong to ovate, obtuse. *Stamens* as many as the petals, shorter than them and inserted at their base; filaments very short. *Stigma* tumid. *Drupe* globose, red, '2 in. across, crowned by the stigma with 5-8 stones.

KHASI HILLS 5000-6000 ft.

Wood white, not used.

Flrs. 4-5. Fr. 7-8.

Hooker describes the flowers as pentamerous but from a large number of specimens examined by me, I conclude they are 5-8 merous.

8. *Ilex Griffithii* Hk. f. Vern. *Kynja-jakrai*, Khasi.

A large bushy evergreen shrub or small tree with spreading branches; branchlets virgate, sparingly pubescent or glabrescent; bark grey or dark-brown, thick, nearly smooth, lenticellate. *Leaves* 1.5-3 by 1-1.5 in., obovate or elliptic, acute, obtuse or rounded at the apex, finely serrulate, thinly coriaceous, glabrous, dark-green and shining above, pale beneath; midrib channelled above prominent beneath; lateral nerves 6 or 7 on either half, very slender; base acute or cuneate; petiole '25-3.5 in. long, channelled. *Flowers* 4-merous, pale-white; males about '2 in. across, in umbel-like compound cymes; pedicels slender. *Female* usually solitary, about '25 in. across, axillary; pedicels quadrangular, stout, about '2 in. long. *Calyx-lobes* orbicular, ciliate. *Petals* broad, oblong, connate below in both sexes. *Stamens* inserted on the corolla. *Ovary* globose; stigma sessile. *Drupe* globose, about '25 in. diam., black when ripe; stones 1-3, rarely 4, coriaceous.

Found in damp places in the plains, e.g. Bechapati, Doloni near Laluka, LAKHIMPUR; Sepakhati, Deroi Reserve and Gaurisagar in SIBSAGAR, SYLHET also KHASI HILLS, 4,-6000.

Flrs. 3-4. Fr. cold season.

9. *Ilex Thomsonii* Hk. f.

A shrub or a small tree attaining 18 ft., with a dense crown; young shoots and inflorescence puberulous. *Leaves* '5-1'5 by '3-6 in., obovate or oblanceolate, acute or subacute, apiculate, margin with few distant teeth, coriaceous, glabrescent above, dotted with dark raised glands beneath; lateral nerves indistinct, 4-6 on either half; base narrowed into the short petiole. *Flowers* 4-merous, white, nearly '1 in. across. *Males* in axillary, peduncled few flowered (usually 3-flowered) cymes; peduncles sometimes 1-flowered, slender up to '3 in. long; pedicels up to '15 in. long. *Females* usually solitary on axillary peduncles; pedicels and peduncles thickening with age. *Calyx* suborbicular or broad ovate. *Petals* suborbicular obovate or oblong, connate at the base in both sexes. *Stamens* nearly as long as petals and inserted at their base. *Stigma* sessile; pistillode in male flowers globose. *Drupe* up to '25 in. across, black when ripe, globose; stones usually 2, planoconvex.

KHASI HILLS 4000-5000 ft.

Flrs. 5-6. Fr. 12.

Fam. 39. CELASTRACEÆ.

Trees or erect or climbing shrubs, sometimes with spinescent branches. *Leaves* opposite or alternate, simple, stipules caducous or 0. *Flowers* regular, small, 2-sexual or polygamous, usually cymose. *Calyx* small, 4-5 lobed, persistent; lobes imbricate. *Petals* 4-5, rarely 0, imbricate, inserted on or below the disk. *Disk* generally conspicuous lobed or entire. *Stamens* as many as petals, inserted under or on the margins of the disk and alternating with the petals, or when the petals are absent opposite to the calyx lobes. *Ovary* 2-5 celled, free on the disk or immersed in it; ovules usually 2 in each cell, rarely 1 or more than 2; style none or 1, rarely 2, short; stigma simple or lobed. *Fruit* capsular, berry-like or drupaceous. *Seeds* usually arillate, sometimes winged; albumen fleshy, sometimes 0.

I. Leaves opposite :—

A. Petals free ; capsule 3-5-celled :—
Trees or erect or climbing shrubs ;
ovules 2 in each cell ; petals not
pitted.

Trees or erect shrubs ; ovules 1 in
each cell ; petals pitted.

Trees ; petals continuous with the
lobes of the disk, crested ; ovules
4 or more in each cell of the ovary.

B. Petals connate at the base ; capsule
1-celled, 1 seeded.

II. Leaves alternate :—

A. Inflorescence paniculate or racemose :—
Scandent shrubs ; leaves serrate ; ovary
not bearded ; style 1.

Trees ; leaves entire ; styles 2.

B. Inflorescence of dichotomous cymes :—
Ovary sunk in the disk : trees
or erect shrubs.

.. 1. *Euonymus*.

.. 2. *Glyptopetalum*.

.. 3. *Lophopetalum*.

.. 4. *Microtropis*.

... 5. *Celastrus*.

.. 6. *Kurrimia*.

.. 7. *Gymnosporia*,

1. EUONYMUS Linn.

Trees or shrubs, sometimes trailing or creeping with adventitious roots, rarely scandent. *Leaves* usually opposite ; stipules caducous. *Flowers* bisexual ; inflorescence usually axillary and 2-3 cychotomously cymose. *Calyx* 4-5-fid ; lobes spreading or recurved. *Petals* 4-5 ; stamens 4-5, inserted on the disk ; anthers broad, 2-celled. *Disk* large, fleshy, 4-5 lobed. *Ovary* sunk in the disk, 3-5 celled ; style short or 0 ; stigma 3-5 lobed ; ovules 2 in each cell, attached to the inner angle, one ascending and sub-basal and the other suspended and on the axis. *Capsule* 3-5 lobed, angled or winged, 3-5 celled, sometimes by abortion 1-celled, coriaceous, rarely echinate ; cells 1-2 seeded, loculicidal. *Seeds* covered by aril, albuminous.

I. Fruits unarmed :—

A. Flowers over '5 in. across ; cyme 3-flowered,
peduncles fairly stout up to 2 in. long.

B. Flowers under '5 in. across, cymes usually
more than 5 fld.* :—

1. Leaves always entire ; flowers usually
5-merous.

2. Leaves usually serrulate or serrate ;
flrs. 4-merous :—

a. Trees :—

i. Leaves not bullate ; petals not
thick :—

Peduncles rather stout ; petals
ovate or oblong.

Peduncles capillary ; petals
orbicular ; capsule deeply
lobed.

ii. Leaves bullate ; petals thick.

b. Usually climbing-sometimes erect
shrubs :—

i. Peduncles under '75 in. long,
never filiform ; style
conspicuous :—

.. 1. *E. grandiflorus*.

.. 2. *E. attenuatus*.

.. 3. *E. Hamiltonianus*.

.. 4. *E. Lawsonii*.

.. 5. *E. bullatus*.

* 3 fld. in some forms of *E. Hamiltonianus*.

Climbing by means of adventitious roots or erect ; nervules of leaves conspicuously reticulate. Flrs. '25 in. across when fully expanded.

.. 6. *E. theæ folius*.

Scandent ; leaves small, nervules not conspicuous. Flowers small ; peduncles flattened.

.. 7. *E. vagans*.

ii. Peduncles usually over 1 in. long, filiform ; style very short or obsolete ; leaves with conspicuous nervules

.. 8. *E. frigidus*.

II. Fruit echinate :—

Creeping shrub ; leaves obovate or oblanceolate.

.. 9. *E. cinereus*.

1. *Euonymus grandiflorus* Wall. Vern. *Si-san*, *Soh-iong-trong-kynther*, *ja-minrei-dykharr*, *Dieng-sit-um*, Kh. *Goldari*, Nep.

Small tree or large shrub, with somewhat obscurely quadrangular branchlets. Bark grey or brownish grey, sometimes almost blackish outside with shallow vertical fissures ; white inside. Leaves 1·5-4·5 by '8-1·6 in., obovate to oblong or elliptic, bluntly short acuminate or acute, serrulate, glabrous, subcoriaceous, nerves impressed above ; lateral nerves fine, somewhat indistinct on either half ; base acute or cuneate ; petiole '2-2·5 in. long. Peduncles usually 3, less often up to 5-flowered, 1-2 in. long, slender, flattened ; pedicels '2-3 in. long. Flowers about 1 in. across, greenish or yellowish-white, 4 merous, Calyx lobes rounded. Petals orbicular or nearly so. Capsule '3-5 in. across, sharply 4-gonous, capped by the short style ; seeds with scarlet aril.

KHASI & JAINTIA HILLS 5000-6000 ft. ; Jeypore-LAKHIMPUR, (Sheet 113 P. T. C.)

Flrs. 5. Fr. 10.

var. A shrub ; leaves linear to narrow oblong-lanceolate, '3-7 in. broad ; nerves quite distinct.

Umjaisai, Nongkersin forests, KHASI & JAINTIA HILLS.

2. *Euonymus attenuatus* Wall.

A tall shrub or small tree with spreading branches and greyish-bark. Leaves 2·5-5·5 by '7-1·7 in., lanceolate-oblong or oblong-elliptic, bluntly acuminate, sometimes abruptly entire, glabrous, coriaceous ; lateral nerves 6-8 on either half, faint ; base cuneate or acute, petiole '2-5 in. long. Flowers usually 5-merous, '25 in. across, in dichotomously branched peduncled cymes. Peduncles thickening in fruit, axillary or from axils of bracts, '5-2 in., long ; pedicels '15-3 in. long. Calyx lobes obtuse, unequal. Petals '25 in., obovate-orbicular. Capsule red, obovoid, 5, sometimes 4-lobed ; aril yellow, seeds black.

Dulong Reserve—LAKHIMPUR, Banks of Loobah Lake—SYLHET, KHASI & JAINTIA HILLS—2-4000 ft.

The leaves in some forms are narrowly lanceolate.

3. Euonymus Hamiltonianus Wall. *Dieng-soh-sat-khlaw, Jamin-rei-dkhar, Kh.*

A small to medium sized tree attaining about 40 ft. in height and nearly 6 ft. in girth; bark grey or greyish-brown, thick, reticulately furrowed and rough outside; white and soft inside. *Leaves* opposite or subopposite, 2-6 by 1-2·2 in., lanceolate, elliptic to oblong or sometimes ovate elliptic, acuminate, finely serrate with deciduous cuspidate teeth, thin; main lateral nerves 7-12 on either half, arcuate; petiole 2-6 in. long. *Flowers* 4-merous, dull-white, 3 in. across in few flowered 2-3-chotomous peduncled cymes; peduncles from leaf axils or often extra-axillary at the base of the growing shoot, flattened, 4-1·5 in.; pedicels rather thick, 1-3 in. long. *Calyx lobes* 1-1·2 in. broad, inner pair larger and subpetaloid, generally broader than long, rounded, ultimately reflexed. *Petals* broadly oblong or ovate oblong, entire, margins reflexed. *Stamens* about half as long as the petals. *Style* prominent, nearly as long as the stamens. *Capsule* 3 in. long, turbinate, deeply 3-4 lobed; seeds enclosed in scarlet aril.

KHASI HILLS 5000-6000 ft., often near villages.

Wood yellowish white, soft, close grained, med. rays extremely fine, takes a good polish. According to Gamble used for carving into spoons and in China for engraving. Not used in this province.

Flrs. 4-5; sometimes 10-second flush? Fr. 10-11.

Var. Cymes not branched usually 3-flowered, peduncles 25-5 in. long.

4. Euonymus Lawsonii C. B. Clarke and Prain. in Journal As. Soc. of Bengal LXXIII, P. 195. Vern. *Soh-dadin, Kh.*

A small tree; bark grey, corky and reticulately fissured outside; white and finely fibrous inside. *Leaves* 2-5 by 1-2 in., elliptic, elliptic-oblong or lanceolate, acuminate, serrate, thinly coriaceous; lateral nerves 7-10 on either half, conspicuous on both surfaces, arcuate, tertiaries prominently reticulate; base cuneate to subrounded; petiole up to 25 in. long. *Flowers* about 2 in. across, dull-white, 4-merous; peduncles 3-7 in. long, slender; dichotomously branched, few flowered from leaf axils or axils of bracts; pedicels filiform, 15-3 in. long. *Calyx segments* broad, obtuse or rounded, concave, entire. *Petals* greenish, broader than long, rounded, revolute at the top. *Capsule* deeply 4-lobed; lobes compressed, 5-6 in. across; seeds with orange aril.

KHASI HILLS 4000-5500 ft., Bishops falls, Mawmulah, Nongstien etc.

Flrs. 5-6. Fr. 10.

5. Euonymus bullatus Wall.

A small tree 15-20 ft. in height; branchlets stiff. *Leaves* 3-8 by 2-3·5 in., ovate to lanceolate, often tapering to a fine point, entire or serrulate, coriaceous when mature, bullate with depressions above along the lateral nerves, which are 5-8 on either side, arcuate, very prominent beneath, tertiaries indistinct; petiole 3-6 in. long, stout, channelled. *Inflorescence* 3-5 in. long,

umbellately or repeatedly 2-chotomously branched. *Flowers* 2 in. across, 4-merous. *Petals* square, thick, red. *Ovary* sessile. *Fruit* 4-gonous, obconic, about 4 in. long.

SYLHET-Wallich! KHASI and JAINTIA HILLS, Cherapunji-Mann! Mausmai-Clarke!—Mamluh, MANIPUR, Watt.
Flrs. 2-5. Fr. 10-12.

6. *Euonymus theæfolius* Wall.

A shrub, sometimes trailing on other trees with adventitious roots, less often epiphytic on other trees, bark brownish or greyish-brown; in old stems rough with lines of lenticels. *Leaves* 2-4·5 by 7-2 in., very variable, usually lanceolate, oblong to elliptic or ovate, acuminate, serrulate or entire; lateral nerves prominent on both surfaces, 7-10 on either half, arcuate, anastomosing near the margin, tertiaries conspicuously reticulate; base acute or cuneate; petiole channelled, 2-3 in. *Flowers* 4-merous in once dichotomously branched peduncled cymes 25 in. across; peduncles 25-5 in. long; pedicels 1-2 in. long. *Calyx lobes* rounded, broader than long. *Petals* red (or white?) about 2-12 in., orbicular, short clawed, entire. *Stamens* smaller than the petals. *Style* short. *Capsule* about 3 in. across, globose, obscurely angled or not, aril yellow or orange.

KHASI HILLS 5000-6500 ft. in shady situations.

Wood light-brown, pores more numerous in spring wood, medullary rays few, very broad and distant and numerous close, with fine ones between; annual rings eccentric, takes a good polish, but liable to crack.

Flrs. 4-5. Fr. 10.

7. *Euonymus vagans* Wall.

A climbing shrub; branchlets quadrangular greyish and covered with warty lenticels when older. *Leaves* 1-2·3 by 5-1 in., ovate, elliptic or oblong lanceolate acuminate, sharply but somewhat distantly serrate, membranous; lateral nerves 5-7 on either half; petiole 1-15 in. *Flowers* 4-merous, small, greenish-white. *Cymes* peduncled, dichotomously once branched; peduncle 3-6 in. long, flattened; branches up to about 25 in. long; pedicels 1-2 in. long. *Calyx lobes* suborbicular, obtuse or rounded, *Petals* minutely crenate or nearly entire; style minute. *Capsule* "size of a pea minutely tubercled."—Lawson in *F. B. I.*

KHASI HILLS-5000 ft.

Flrs. 3-4.

Sub sp. *macrophylla*. A shrub creeping on trunks of trees by means of adventitious roots; branchlets with 4 sharp ridges, glabrous. *Bark* on old stems dark grey or brown to almost black, lenticellate and rather rough. *Leaves* 3-6·5 by 1·2-3·2 in., obovate, elliptic to oblong or oblanceolate, acuminate or acute, cuspidate serrate or serrulate, subcoriaceous, glabrous; lateral nerves 5-7 on either half, arched, tertiaries inconspicuous; base cuneate; petiole 3-5 in. *Calyx* spreading, broader than long, rounded with brown dots inside, *Petals* orbicular, often broader than long, erose, white, usually with close purplish-brown dots. *Stamens* 4; filaments very short. *Style* short. *Capsule* up to 3 in. across, globose, minutely verrucose, indistinctly 2-4 lobed, 1-4 seeded. *Seeds* about 15-1 in., aril orange red, testa brownish-grey, minutely reticulated.

Saral bhanga block-GOALPARA-Muktarchapar-an island opposite Dibrugarh on the Brahmaputra.

Growth of stem eccentric, annuai rings widest on the side of the supporting tree, the original stem forming a vertical ridge on the outer side of the stem. Wood light brown, structure resembling that of *E. theæfolius*.

Flrs. 1-2. Fr. 12-1. (next year).

8. *Euonymus frigidus* Wall.

A shrub about 4-5 ft. high, stem brown, shining with round lenticels, branchlets sharply 4-angled, youngest channelled. *Leaves* 2·5-5·5 by 1·2 in., lanceolate or linear lanceolate, caudate acuminate, sharply serrate, glabrous, tough and thin; lateral nerves 8-12 on either half, irregular, arcuate, prominent beneath; base tapering; petiole 2·4 in. long. *Flowers* 15 in. across, 4-merous, greenish-yellow in few flowered axillary and extra-axillary branched cymes; peduncles very slender, 1-1·5 in. long, branches filiform, 2·3 in.; pedicels filiform, about 1 in. long. *Calyx lobes* suborbicular ovate, obtuse or rounded. *Petals* orbicular, entire. *Style* very short or 0? *Capsule* 4 lobed or winged or not lobed.

Flrs. 5-6. Fr. 9-11.

KHASI HILLS 5000-6000 ft.

Var. 1. A shrub creeping on trees, rock etc. by means of adventitious roots; stem greyish-brown, somewhat rough with lenticels; branchlets sharply 4-angled, youngest channelled. *Leaves* 1·7-3·5 by 1·5 in., lanceolate, oblong-lanceolate, elliptic-ovate to oblong, acuminate, sharply serrate, thinly coriaceous; lateral nerves 7-10, conspicuous, arcuate, anastomosing near the margin. *Flowers* apparently 4-merous. *Peduncles* slender, 3-5 in. long; pedicels filiform, 15 in. *Fruit* about 2 in. across, globose, not lobed; style 0, (?) aril yellowish.

Kynshi forests. KHASI & JAINTIA HILLS.

Fr. 10.

Var. 2. *elongata* King mss.—has leaves 6-8 by 2·5-3 in.

MANIPUR—Watt!

9. *Euonymus cinereus* Lawson.

A scandent shrub which creeps on trees by means of adventitious roots, branches 4-gonous, grey, glabrous. *Leaves* 1·5-3 by 1 in., obovate or oblanceolate, membranous, pale beneath, serrate, glabrous; lateral nerves 3-7 on either side, very slender; petiole 2·3 in. long, channelled. *Inflorescence* usually axillary; pedicels 1·5-2 in. long. *Flowers* 2 in. across, 4-merous. *Sepals* ovate, acute. *Petals* 4, orbicular, toothed, except at the base. *Capsule* echinate, seeds subglobose.

Nambor Forests-Watt.

Flrs. 4-5.

***Euonymus echinatus* Wall.**—A trailing evergreen shrub with numerous adventitious roots on the stem by means of which it climbs on trees and rocks; branchlets with 4 raised lines. *Leaves* 1-3 by 1·3 in., elliptic to ovate lanceolate, acute or acuminate, serrate, sometimes coarsely; thinly coriaceous, nerves conspicuous, lateral nerves 6-8 on either half; petiole

·1·25 in. long. *Flowers* 4-merous in axillary cymes; peduncles ·5-1 in. long; pedicels ·1·3 in. long. *Calyx*-lobes entire, rounded. *Petals* orbicular, minutely toothed or nearly entire. *Style* thick. *Capsule* ·3 in. across, globose, covered with conical tubercles; aril scarlet.

Rsong forests at 4200 ft.—Sutynga, KHASI & JAINTIA HILLS. Material (My sheet No. 6473) rather incomplete for satisfactory determination.

2. GLYPTOPETALUM Thwaites.

Glyptopetalum Griffithii Prain.

A shrub about 8 ft. high, branchlets glabrous, often grooved, when young. *Leaves* opposite, extipulate, 3·5-6 by 1·5-2·7 in., elliptic-oblong to lanceolate, bluntly short acuminate, crenate-serrate, sometimes obscurely entire towards the base, thinly coriaceous, glabrous, lateral nerves prominent, 6-8 on either half, arcuate, upper end nearly parallel to the margin; base acute or subobtuse; petiole channelled, stout, ·2-4 in. long. *Flowers* small, 4-merous, usually in axillary and terminal cymes; peduncles up to ·4 in. long, sometimes obscure, branches ·25-·4 in., but sometimes up to 1 in. (at least in fruit) long; * pedicels usually longer than the peduncles. *Calyx* persistent, lobes spreading, rounded, broader than long, about ·1 in. across. *Petals* with 2 shallow pit-like depressions on the upper surface. *Stamens* inserted above the disk, connective dilated. *Disk* 4-lobed. *Ovary* immersed in the disk, 4-lobed, 4-celled; stigma capitate; ovule 1 in each cell, pendulous. *Capsule* ·3-·6 in. across, globose, rugose outside, walls coriaceous. *Seeds* 1-4, suspended at the apex from a concave shield-like placental (?) outgrowth, covered with red aril, albuminous.

Pasighat—N. E. FRONTIER DISTRICT.

Fr. 12.

3. LOPHOPETALUM Wight.

Lophopetalum fimbriatum Wight. Vern. *Rumu*, Ass. *Sutrong*, Sylh., *Dieng-ja-rem*?, Khasi.

A large tree attaining nearly 100 ft. in height. *Bark* grey, rough outside with horizontal wrinkles, uniformly pink inside, branchlets glabrous. *Leaves* opposite or subopposite, 3-6 by 1·5 to 3·2 in., ovate or ovate-oblong, entire, shortly acuminate or acute, subcoriaceous; lateral nerves 10-12 on either half, arcuate, nervules conspicuously reticulate; base rounded; petiole ·4-8 in. long. *Flowers* dark-red, ·4-·5 in. across, 5-merous in axillary or terminal divaricating, paniculate cymes, 1·5-4 in. long; pedicels up to ·25 in. long, bracteoles minute. *Calyx* lobes short, broad, obtuse, erose. *Petals* continuous with the disk, persistent, ·15 in. long, orbicular with a fimbriate crest. *Stamens* inserted on the disk. *Disk* large, 5-lobed. *Ovary* sunk in the disk, triquetrous, 3-celled, each cell with few superposed

* The branches are sometimes absent or obscure.

ovules on axile placentas, contracted into the short style.
Fruit not seen.*

Kwasing reserve, Barduar reserve-KAMRUP; Longai reserve-SYLHET; Shella-KHASI & JAINTIA HILLS? (materials insufficient for correct determination).

Wood considered to be one of the best for tea chests and said to be as good as *Poma* for this purpose.

Flrs. 4.

4. MICROTROPIS Wall.

Microtropis discolor Wall. Vern. *Toykhata*, Lush.;

A small glabrous evergreen tree or large shrub. *Bark* brown or grey exfoliating in rectangular or irregular flakes, .5-1 by .2-.5 in., thin; blaze finely fibrous, greenish-brown, brittle. *Leaves* opposite, 2-farious, stipulate, 2-5 by 1.2-2.5 in., elliptic to obovate or oblanceolate, abruptly caudate-acuminate, the extremity of the tail rounded but generally with a short cusp, quite entire, membranous, flat, glabrous, dark-green above, pale beneath; lateral nerves about 5-9 on either side of the midrib, indistinct; base cuneate; petiole .3-.6 in. long, channelled, margined. *Flowers* greenish-white, 2-sexual, 4-5 merous, in compact, pedunculate, axillary or more generally supra-axillary 3-chotomous, bracteate cymes; peduncles .1-.25 in. long; pedicels very short or 0. *Calyx-lobes* orbicular, about .05 in. across, imbricate, green but with a narrow brown margin. *Petals* about .15 in. long, elliptic, concave, imbricate. *Disk* obsolete. *Filaments* very short, subulate. *Ovary* free, 2-3 celled with 2-collateral ovules in each; style very short. *Fruit* a 1-celled 2-valved 1 seeded capsule, .5-.7 by .3-.7 by .3-.4 in., ellipsoidal or ovoid, supported by the persistent calyx, somewhat verrucose outside. *Seed* stipitate, remaining on the tree even after the dehiscence of the capsule, bright red and beautifully veined outside; embryo straight; radicle inferior; cotyledons flat; albumen pearly-translucent, reddish.

Bhoreli Reserve-NORTH LAKHIMPUR; Barpathar and Garampani in SIBSAGAR; SYLHET, CACHAR and the KHASI HILLS up to 4500 ft.

Wood white, soft, weighing 30 lbs. per c. ft.

Flrs. & Fr. throughout the year, especially the cold season.

5. CELASTRUS Linn.

Shrubs, usually climbing anticlockwise. *Leaves* alternate, serrate; stipules 0 or minute and deciduous. *Flowers* small, polygamous, usually 5-merous, in axillary or terminal panicles or racemes. *Calyx* 5-cleft. *Petals* 5, spreading. *Disk* broad, concave. *Stamens* 5, inserted on the edge of the disk. *Ovary* free, 2-4 celled with 2 ovules in each cell; style short; stigma 3-lobed.

* In the genus a 3-4 an led 3-4 celled loculicidal capsule.

Fruit a globose or obovoid loculicidal capsule, 1-3-celled, 1-6 seeded. *Seeds* arillate, albumen fleshy; cotyledons leafy.

Branchlets lenticelled, terete :—

Flowers in large terminal panicles; style simple. ... 1. *C. paniculata*.

Flowers in axillary or terminal, short or racemose cymes; style 3-cleft. .. 2. *C. stylosa*.

Branchlets not lenticelled. Flowers in axillary and terminal narrow cyme-bearing panicles :—

Branchlets terete, style simple. .. 3. *C. venulosa*.

Branchlets quadrangular; style 3-cleft at top; capsule 1-celled, 1-seeded. ... 4. *C. monosperma*.

1. *Celastrus paniculata* Willd. Vern. *Pokitai*, Miri; *Samhaplau*, Kach.; *Malkagni*, Beng. & Hind.; *Mi-keroat*, *Mei-la-lih*, Khasi; *Tylle-soehlain*, Synt.

A large woody climber with corky bark; young shoots marked with lenticels. *Leaves* very variable in size and shape, generally 2.5 by 1.5-3 in., obovate, orbicular, elliptic or oblong-lanceolate, shortly acuminate, crenate or crenulate, more or less coriaceous, glabrous; base acute; lateral nerves 4-8 on either half, almost parallel to the margin; petiole .4-.6 in. long. *Panicles* terminal, large, drooping, pubescent, branching into compound cymes; pedicels very short. *Flowers* .15 in. across, pale-green. *Calyx* lobes rounded, minutely toothed. *Petals* oblong. *Anthers* large, about as long as the petals, small and without pollen in female flowers. *Pistillode* in male flowers rudimentary. *Disk* larger in female flowers. *Style* simple. *Capsule* .4-.6 in. across, globose, usually 3-celled, bright or orange yellow when ripe, marked outside with parallel horizontal wrinkles. *Seeds* 1-2 in each cell, enclosed in a red aril, albumen translucent, very oily; cotyledons green.

Throughout ASSAM ascending to 2500 ft., in KHASI HILLS.

The seed yields an oil which has diuretic and diaphoretic properties and is believed to be a specific for Beri-beri. It can also be burnt in lamps. Powdered dry bark is applied on cuts for healing.

Flrs. 4-5. Fr. cold season.

Var. *venulosoides*—both the valleys in Assam with leaves almost as strongly reticulate as those of *C. venulosa*. The panicles are generally shorter and narrower but the seeds are somewhat larger than in the type.

2. *Celastrus stylosa* Wall. Vern. *Mei-jendru*, Khasi.

A woody climber resembling the last species; branchlets terete, brown or dark-brown, almost black, closely lenticellate. *Leaves* 2.5 by 1.2-8 in., elliptic, oblong-elliptic to lanceolate or obovate, shortly acuminate, often abruptly acute or cuspidate-serrate, midrib often red beneath in young leaves; lateral nerves 5-8 on either half, arcuate; petiole up to 1 in. long, often red. *Flowers* greenish-white, up to .2 in. across in axillary and terminal, puberulous, short or racemose cymes, much shorter than the leaves; pedicels capillary up to .1 in. long. *Calyx* segments green with thin white margins, oblong or ovate, minutely erose, with rounded or obtuse apex. *Petals* .2 in. long, oblong or spatulate, membran-

ous, with wavy hyaline margins; style elongate, 3-cleft. *Capsule* .25-.3 in. across, crowned by the remains of the style, yellow when ripe, transversely shrivelled in drying. *Seeds* about .2 in. long, enclosed in red aril, drying dark brown or almost black, perhaps less oily than of the preceding species.

Sarman-bheti in the Mikir Hill reserve-SIBSAGAR-probably also other parts of Mikir Hills, KHASI HILLS up to 5500 ft.

Flrs. 3-4. Fr. 10-12.

3. *Celastrus venulosa* Wall.

A large woody climber which when cut exudes copious clear potable water, branchlets not lenticelled. *Leaves* 3-6 by 1.5-2.5 in., elliptic-oblong or obovate, abruptly and shortly acuminate, cuspidate-serrulate, chartaceous, shining on both surfaces; turning yellow before falling; lateral nerves 7-8 on either half, arched, prominent beneath, tertiaries transverse, closely and conspicuously reticulate; base acute or cuneate; petiole .3-.5 in. long, channelled. *Flowers* white, articulate with the short pedicels and soon breaking off from them, generally in long narrow-cyme-bearing terminal panicles, sometimes in shorter axillary ones. *Calyx-segments* rounded, somewhat laciniate. *Petals* 5, about .15 in. long and almost as broad, on large cup-shaped disk. *Stamens* 5; style not lobed. *Capsule* not seen.

Charduar Reserve in DARRANG, SYLHET, Wallich.

Flrs. 1-2. Fr. 3-4 (?).

4. *Celastrus monosperma* Roxb. Vern. *Gelomtaru*, Duff., *Bhumlati*, Ass.

A large glabrous woody climber, branchlets quadrangular, not lenticelled, hollow. *Leaves* 2-5 by 1.2-2.7 in., elliptic, oblong or obovate, abruptly and bluntly short acuminate, cuspidate serrate or serrulate, chartaceous, dark green and shining above, pinkish beneath; lateral nerves 5-7 on either half, much arched, tertiaries slender, sub-scalariform; base subacute to almost rounded; petiole .2-.3 in. long. *Flowers* whitish, .15 in. across, in peduncled cymes, often arranged on elongated terminal and axillary panicles up to 7 in. long, rachis quadrangular; buds globose; pedicels about .1 in. long, bracteoles minute, persistent. *Calyx lobes* orbicular in bud, slightly elongated in open flowers, usually minutely erose. *Petals* .1 in. long, broadly oblong or obovate-oblong. *Anthers* very broad, purplish-brown, dotted. *Style* 3-lobed at the apex, gradually narrowed upwards from the ovary. *Capsule* about .5 in. long, 3-valved 1-seeded. *Seed* about .3 in., ellipsoid.

Dulong Reserve—LAKHIMPUR; NAGA HILLS; probably also in SYLHET, KHASI HILLS and KAMRUP.

Flrs. 3-4. Fr. 10?

***Celastrus Championii* Benth.** A large woody climber. *Branchlets* terete, lenticellate, youngest hollow. *Leaves* 3.5-6.5 by 1.2-3 in., obovate-elliptic, oblong or oblong lanceolate, bluntly short acuminate, chartaceous or coriaceous, somewhat distantly cuspidate serrulate; lateral nerves 5-7 on either

half, tertiaries sub-scalariform; petiole '3-5 in. long, grooved. *Cymes* peduncled, sometimes racemose, often somewhat distantly arranged on axillary terminal panicles. *Flowers* '15-2 in. across; pedicels '1 in. long, bracteoles persistent. *Calyx-lobes* orbicular, minutely laciniate. *Petals* broadly oblong, anthers broad, purplish-brown, dotted; style 3-grooved at the apex, distinct. *Capsule* '6-8 in. obovoid, 3 valved 1 seeded. *Seed* '5 by '3 in., ellipsoid, enveloped in bright orange-yellow aril which is mealy astringent and sweetish; albumen fleshy.

Umta sail; Mynso road—KHASHI HILLS, 3500-5500 ft., NAGA HILLS, SYLHET-Brandis.

Closely allied to *C. monosperma* of which it may be regarded as a robust form.

***Celastrus membranifolia* Prain.**—A shrub, leaves membranous, ovate lanceolate, serrate; petiole '6 in. long.

KHASHI HILLS. I have seen no specimens.

6. KURRIMIA Wall.

***Kurrimia pulcherrima* Wall.** Vern. *Hinguri*, Ass. (Nowg.); *Tamser*, Mik.; *Makhang*, Kuki; *Dieng-mat-wei*, *Dieng-soh-ngang*, Khasi.

A large glabrous evergreen tree, up to 90 ft. in height and 5 ft. in girth with an oval crown and spreading branches; trunk much fluted and buttressed at the base when old. *Bark* dark greyish-brown outside, somewhat rough and of a darker colour with age, light greenish-brown and mottled with minute dots inside. *Leaves* alternate, bifarious, very variable in size and shape. 3-10 by 1-3.5 in., elliptic to oblong lanceolate, shortly acuminate, quite entire, chartaceous or coriaceous, quite glabrous, shining above, red when very young; lateral nerves 10-16, on either side of the midrib, arched, very slender, raised on the lower surface, tertiaries extremely fine, about '01 in. apart, parallel and transverse to the midrib; base more or less rounded; petiole slender, '5-1 in. long, swollen below the base of the blade, finely channelled above; stipules lanceolate, convolute. *Flowers* white, about '15 in. across, shortly pedicelled, in axillary, solitary or paired, simple, rarely compound racemes, 3-5 in. long. *Calyx* 5-fid; segments recurved, subpersistent. *Petals* 5, about '1 in. long, oblong, recurved, inserted on (?) the margin of the cup-shaped fleshy 5-lobed puberulous disk. *Ovary* crowned at the top with a tuft of hairs; styles 2, filiform; ovules 2 in each cell, erect. *Fruit* a 2-valved 1-celled capsule, generally 1-seeded, lanceolate in outline, '8-1.5 by '3.5 in. *Seed* erect; aril fleshy, yellow, complete except for a small terminal aperture; albumen fleshy, white.

Fairly common, though not abundant throughout the PROVINCE.

Wood coarse grained, reddish-brown with close concentric lines of soft tissue and close and regular medullary rays thus presenting appearance of coarse cloth on a transverse section. Weight varies between 44 and 48 lbs. per c. ft. It is said to be brittle.

Flrs. 9-10. Fr. 1-3.

7. GYMNOSPORIA W. & A.

Shrubs or small trees often armed. *Leaves* alternate, usually serrate, stipulate or extipulate. *Flowers* 2-sexual, small, greenish or yellowish in axillary or subaxillary often clustered dichotomous cymes ; cymes often much contracted. *Calyx* 4-5 fid or 4-5 partite. *Petals* 4-5, spreading. *Stamens* 4-5, inserted usually below the disk. *Disk* broad, sinuate or lobed. *Ovary* confluent at the base with the disk or more or less sunk in it, 2-3 celled, with short style and 2-3 stigmas ; ovules 2 in each cell. *Capsule* usually obovoid, rarely globose, 3-gonous, 2-3 celled, 1-4 seeded ; seeds aluminous, aril partially or entirely covering the seeds or rarely 0.

Armed ; spines not bearing leaves, inflorescence usually reddish.

.. 1. *G. rufa*.

Unarmed ; inflorescence yellowish green.

.. 2. *G. acuminata*.

Gymnosporia rufa Laws.

An erect shrub or small trees often armed with simple axillary spines up to .4 in. long, all parts glabrous or the branchlets glaucous. *Bark* dark grey or brown, rough, often reticulately fissured ; blaze red with fine white lines. *Leaves* 2-5 by .5-1.5 in., oblong-lanceolate to elliptic-lanceolate, bluntly rarely sharp acuminate, crenate serrate, thinly coriaceous ; lateral nerves 7-10 on either half ; base narrowed ; petiole .1-.3 in. long, reddish, slightly margined towards the top ; stipules deciduous, up to .1 in. long, subulate, margins setose. *Flowers* about .1 in. across, greenish white. *Cymes* axillary or below the leaves ; peduncles up to .8 in. long ; reddish, filiform ; pedicels very slender. .1 in. long ; bracts and bracteoles very small. *Calyx* 5, triangular ; petals 5, sub-orbicular. *Capsule* .3 in. across ; 2-3 valved, opening along the upper portions of valves and septa, aril covering nearly the whole seed when mature.

KHASI HILLS ascending to about 4000 ft.

Flrs. 4. Fr. 5-6.

2. Gymnosporia acuminata Hk. f. Vern. *Dieng-chandre*, Kh.

A small unarmed tree attaining 30 ft. *Bark* brown to almost blackish, rough, warty ; blaze red with vertical white lines. *Leaves* usually 2-5 by 1-2 in. (according to F. B. I. 5-8 by 2-3.3 in.) lanceolate, elliptic-lanceolate or oblanceolate, short acuminate, serrate, thin ; lateral nerves 7-9 on either half ; base cuneate ; petiole .2-.25 in. long, channelled. *Flowers* small in yellowish dichasial peduncled cymes ; peduncles yellowish green, very slender, fascicled on axillary tubercles, .5-1 in. long ; pedicels up to .1 in. long. *Calyx* lobes triangular ovate, minutely erose. *Petals* a little longer. *Capsules* .3 in. long, mostly 2-celled, compressed, lower half covered with lacerate aril.

KHASI HILLS 2500-4600 ft. Nangkhlaw, Syndai.

Flrs. 4. Fr. 6 ?

G. salicifolia *Lawson*. A shrub (?). *Leaves* 3-5 by 1.5 in., narrowly lanceolate, serrate, glabrous; lateral nerves faint, 12-15 on either side; petiole 2 in. long. *Cymes* paniced, axillary, branches of panicles filiform. *Flowers* 15 in. across. *Capsule* not seen.

A solitary specimen in Calcutta Herbarium "Digunaddi—GARO HILLS" collected about 1850.

Flrs. 3-5.

Imperfectly known species :-

G. neglecta *Wall. Cat.* A shrub? with stout branches. *Leaves* 4-6 by 2-2.5 in., ovate-elliptic, acute or subacuminate, entire or very faintly serrate towards the apex, coriaceous, glabrous. *Flowers* small in very slender dichotomous cymes. *Fruit* nearly globose about .25 in. across, 3-celled, 1-3 seeded—*F. B. I.*

SYLHET—Wallich.

FAM. 40. HIPPOCRATEACEÆ.

Small trees or erect or climbing shrubs. *Leaves* opposite or alternate, simple, often coriaceous. *Flowers* usually very small in axillary dichotomous cymes or clustered, often on tubercles. *Calyx* 5 lobed, lobes imbricate. *Petals* 5, inserted below the disk. *Disk* fleshy, cup-shaped. *Stamens* usually 3, inserted on the inner side of the disk, at first erect, then recurved; filaments dilated. *Ovary* more or less sunk in the disk, 3-celled; style 1; stigmas usually 3 lobed; ovules 2 or more in each cell, on an axile placenta. *Fruit* of samaroid carpels or baccate and 1-3 celled. *Seeds* usually many, often angular, sometimes winged; albumen 0; cotyledons large.

Fruiting carpels samaroid, dehiscent, seeds winged.
Fruit globose, baccate, seeds not winged.

.. 1. *Hippocratea*.
.. 2. *Salacia*.

1. HIPPOCRATEA Korth.

Climbing glabrous shrub (Assam species); branches opposite, often coiled. *Leaves* opposite, usually 2-farious, serrate or crenate; stipules small, caducous. *Flowers* small, sometimes minute, bracteate, in axillary umbelliform cymes or in axillary and terminal paniced cymes. *Calyx* small, 5-partite. *Petals* 5, thick, imbricate or valvate. *Stamens* 3, ultimately recurved. *Ovary* 3 celled; style very short or 0; ovules in 2 series, 2-10 in each cell. *Fruit* samaroid with 1-3 wing-like flattened carpels which dehisce in a straight slit along their centre. *Seeds* compressed, winged, the wing being pointed towards the base of the fruit; albumen 0; cotyledons large, connate.

- I. Flowers minute not exceeding .05 in. in diam., mostly in axillary umbelliform cymes; valves of samara coriaceous, striated; wing of seed oblong, greenish-brown :—
 Leaves narrowly elliptic or lanceolate, membranous. .. 1. *H. indica*.
 Leaves ovate or broadly elliptic, chartaceous or thinly coriaceous. ... 2. *H. arborea*.
- II. Flowers up to .2 in. in diam., mostly in terminal paniced cymes; valves of samaras woody, scarcely striated; wing of seed ovate-elliptic, red :—
 Leaves broadly elliptic, very coriaceous, entire or nearly o. .. 3. *H. macrantha*.

1. Hippocratea indica Roxb. Vern. *Atari-lata*, Beng. (Cach); *Sibrai-ia-dam*, Cach., *Phirke-lera*, Nep.; *Bom-pel-thing*, Kuki.

A bushy shrub with sarmentose branches which climb by means of coiled branchlets. *Leaves* very variable in size and shape, drying green, 2-7 by 1.2-3.5 in., ovate, elliptic oblong or lanceolate, finely acuminate, serrate with deciduous cusps, membranous, more or less shining; lateral nerves 4-6 on either half, slender, much arched, raised on both surfaces; base cuneate, often slightly oblique; petiole .5-8 in. long, deeply channelled. *Inflorescence* axillary, 5-chotomously branched. *Flowers* very small, rusty yellow, sweet scented in axillary and terminal repeatedly trichotomous or dichasial compound pedunculate cymes, bracteate at the joints and also at the base of the pedicels, ultimate branches umbel-like; bracts subpersistent, acuminate, lacinate or ciliate; buds globose. *Calyx* segments triangular or ovate, ciliolate. *Petals* usually 6, elliptic-oblong, concave. *Mature carpels* 2-3.5 by .7-1 in., oblong, usually 2-seeded; valves leathery, longitudinally striated outside; seed about .5 in. long, wing 1.5-2 by .5-6 in., oblong, sub-chartaceous, with a strong dorsal and a median nerve, glabrous.

South-Western parts of the SIBSAGAR DISTRICT from Barpathar to Dimapur; GOALPARA, N. C. HILLS, SYLHET and CACHAR.

Wood white, tough and compact. The Nepalese use the switchy branches with portions of the branchlets for spinning strands in making ropes.

Frs. 5-6. Fr. 10-12.

The plant is often affected by Fulgorid bugs.

2. *Hippocratea arborea* Roxb.

A tall climber apparently never bushy, climbing by means of hooked branches and spreading itself on crowns of tall trees. *Leaves* generally much larger than those of the preceding species, 4-7 by 2-3.5 in., ovate, obovate or elliptic, acute or bluntly acuminate, cuspidate-serrate, with deciduous black or brown tips, chartaceous; lateral nerves 5-7 on either side of the midrib, slender, much arched; base cuneate; petiole .6-8 in. long, stout, channelled. *Inflorescence* and flowers* as of the preceding species. *Mature carpels* 3-4.5 by 1 in., oblong with cuneate base, generally 2-seeded; valves leathery, longitudinally striated outside, smooth

* The flower is sometimes attacked by a gall-insect which transforms the fruit into fleshy globose bodies about .25 in. across.

inside ; seed about 1 by .4 in. ; wing 2 by .75 in., scarcely veined with a thick corky back ; median nerve very faint or obsolete.

Barpathar, Merapany also the Mikir Hills in SIBSAGAR and KAMRUP.
Fls. 5-6. Fr. 12-1.

As pointed out by Lawson in Flora of British India, this should be properly regarded as a variety of the last species from which it differs in but little except its more robust size.

3. *Hippocratea macrantha* Korth.

A very large woody climber which climbs to the top of tall trees and spreads itself on their crowns ; bark grey outside, reddish inside. *Leaves* 4-7 by 2-3 in., generally elliptic, often oblong or obovate, rounded or bluntly short acuminate, minutely cuspidate, crenate or subentire, thickly coriaceous, dark-green, shining on both surfaces ; lateral nerves generally 6 on either side of the midrib, arched, raised and conspicuous on the undersurface ; base usually cuneate ; petiole .5-.7 in. long, stout, margined. *Inflorescence* a cyme-bearing panicle, 3-5 in. long, axillary as well as terminal, the latter often terminating in a pair of small thin leaves. *Flowers* white or pale-yellow, about .16-.2 in. across. *Calyx lobes* 5, ovate or deltoid with thin reddish margins. *Petals* 5, apparently dimorphic in some flowers (males ?), strap-shaped with convolute margins, in others (females ?) ovate, much shorter, broadly imbricate, the latter on shorter and stouter pedicels. *Mature carpels* 3-5 in. by 1-1.3 in., flat, woody, reddish inside, generally 4-seeded. *Seeds* .6-.7 by .2-.3 in. ; wing 2-2.5 by .6-.7 in., reddish, very thin, shining with a thin, dorsal and slender but distinct median nerve.

Mikir Hills in SIBSAGAR and Charduar in DARRANG. Distribution KAMRUP.

Fls. 11-12. Fr. January onward.

2. SALACIA Linn.

Sarmentose shrubs, sometimes small trees. *Leaves* opposite, exstipulate. *Flowers* small, solitary, few or many, generally in axillary clusters. *Calyx* small, 5-partite. *Petals* 5, imbricate in bud. *Disk* thick, broad or conical. *Stamens* usually 3 ; filaments recurved ; anthers small, sometimes dehiscing transversely. *Ovary* immersed in the disk, 3-celled ; style very short ; ovules 2-8 in each cell, generally in 2 series. *Fruit* a berry, fleshy or leathery. *Seeds* usually angular, not winged ; albumen 0 ; cotyledons corrugated.

Berry smooth, not exceeding .5 in. in diam., 1-celled on a slender pedicel, .5 in. long.

Berry wrinkled, 1.5-2 in. diam., 2-3 celled, subsessile.

.. 1. *S. prinoides*.

.. 2. *S. Roxburghii*.

1. *Salacia prinoides* DC.

A semi-scandent woody shrub ; branches very smooth, more or less 4-cornered ; bark white inside. *Leaves* 1.5-3 by .7-1.2 in.,

oblong elliptic or lanceolate, bluntly acuminate, crenate, coriaceous, dark-green and shining above, pale beneath; main lateral nerves 5-6 on either side of the midrib, faint; base cuneate petiole 2-3 in. long, slender, margined. *Flowers* about 2 in. across, pale-green or yellowish, with an offensive smell, usually fascicled on axillary tubercles; pedicels 2-3 in. long, slender. *Sepals* small, puberulous, ciliate. *Petals* clawed, about 1 in. long, broadly obovate, entire but with a wavy margin. *Disk* cup-shaped, fleshy, persistent and accrescent in fruit. *Stamens* on the inner margin of the disk; filaments slender, terete, but with an abruptly dilated broad base. *Ovary* 3-celled. *Berry* 1-celled, 1-seeded, 3-5 in. across, globose, minutely rugose outside, red when ripe; seed conforming, not angular, surrounded by a white sweet pulp.

Barpathar and Kamargaon in SIBSAGAR, generally in scrub forest, KAMRUP.

Fls. 1-3. Fr. 2-4.

2. *Salacia Roxburghii* Wall. Vern. *Ain-kimbel*, Abor; *Sibraietam*, Kach.

A large woody climber; branchlets more or less angular; bark dark-grey, rough; inside white with brown streaks, fibrous. *Leaves* 3-5 by 1-2 in., elliptic-oblong or oblong lanceolate, caudate-acuminate, entire or nearly so, coriaceous, glabrous, dark-green and shining above; lateral nerves 6-8 on either side of the midrib, arched; base acute or subacute; petiole 2-3 in. long, margined, rather thick. *Flowers* greenish, about 15 in. across, in fascicles of 3-6 from axillary bracteate tubercles; pedicels slender, 3-6 in. long. *Sepals* small, orbicular, subciliate. *Petals* suborbicular, about 1 in. long, not clawed. *Filaments* short, dilated; anthers transverse. *Berry* deep pinkish red, 1.5-2 in. across, globose, 2-3 celled with one seed in each cell; rind thick and leathery; pulp red, gelatinous, edible.

Fairly common in evergreen forests throughout UPPER ASSAM, e.g. Nizamghat and Pasighat, NORTH EAST FRONTIER DISTRICT; Sola, Deroi and Nambor Reserves in SIBSAGAR; Bahali in DARRANG.

Wood yellowish. The ripe fruit is eaten.

Flrs. 12-3. Fr. 7-10.

***Salacia membranacea* Laws.**—*Leaves* 3-5 by 1-3 in., ovate elliptic or lanceolate, more or less caudate-acuminate, membranous or thinly coriaceous, entire; main lateral nerves about 8 on either half; base abruptly cuneate; petiole 3-3.5 in. long, channelled. *Flowers* small in axillary fascicles. *Fruit* globose, (?) about 3 in. across (?).

ASSAM—Jamuna falls—Jenkins!

According to Gamble only a form of *S. Roxburghii*.

Flrs. 2-3.

***Salacia floribunda* Wight.**—A scandent shrub. *Leaves* 3-6 by 1-2 in., elliptic or oblong shortly and obtusely acuminate, sharply serrate, coriaceous, glabrous, dark-green, shining above; lateral nerves 9-12 on either half, slender, arched; petiole 3-5 in. long, channelled. *Cymes* peduncled, usually axillary, often with supra-axillary pair. *Berry* globose, about 9 in. across (sometimes up to 2 in. long, (Mann's sheet in Sibpur herbarium) with irregular ridges.

ASSAM and KHASI HILLS—*Griffith*, SYLHET—*De Silva*.

FAM. 41. RHAMNACEÆ.

Trees or shrubs, often armed, sometimes climbing, rarely cirrhose. *Leaves* simple, generally alternate, rarely opposite, often with strong basal nerves ; stipules small, deciduous or changed into prickles and persistent. *Flowers* hermaphrodite or polygamous, regular, small, greenish, usually in axillary simple or paniced cymes. *Calyx* 4-5 cleft, generally inferior ; segments valvate, triangular, often with a median ridge within. *Petals* 4-5, rarely 0, inserted on the calyx tube, usually clawed, and hooded, *Stamens* 4-5, opposite to the petals and often enclosed within their folds ; filaments usually filiform ; anthers versatile. *Disk* fleshy or thin, usually glabrous. *Ovary* free or more or less immersed in the disk or calyx-tube, usually 3-celled with one erect ovule in each cell ; styles united, short. *Fruit* various, generally indehiscent, 1-4 seeded. *Seed* with copious albumen, rarely exalbuminous ; embryo large, erect.

- I. Ovary superior or half superior :—
 - A. Fruit dry, winged or compressed at the apex like a wing :—
 - Unarmed climber ; fruit indehiscent with a long terminal wing. .. 1. Ventilago.
 - Unarmed climber, fruit capsular, compressed like a wing above the seed. .. 2. Smythea .
 - B. Fruit not dry, not winged :—
 - a. Leaves more or less oblique, 3-5 nerved at the base ; disk thick, lining the calyx-tube :—
 - Erect or scrambling shrubs, armed with stipular prickles ; peduncle not thickened in fruit, fruit with solitary stone. .. 3. Zizyphus.
 - Unarmed tree, peduncle thickened in fruit, fruit with 3 pyrenes. .. 4. Hovenia.
 - b. Leaves symmetrical without basal nerves, disk thick, lining the calyx-tube :—
 - Leaves alternate, nerves prominent, parallel ; stone solitary, 2-celled, 3-seeded. .. 5. Berchemia.
 - Leaves opposite or subopposite, nerves not parallel, fruit with 3 1 seeded pyrenes ; straggling shrubs. .. 6. Sageretia.
 - c. Leaves symmetrical, disk thin, lining the calyx tube, spinescent or unarmed erect shrubs, fruit with 2-4 pyrenes. .. 7. Rhamnus.
- II. Ovary inferior, Shrubs climbing by tendrils. Leaves symmetrical alternate, fruit a 3-winged capsule. .. 8. Gouania.

1. VENTILAGO Gaertn.

Unarmed scandent shrubs ; stem generally blackish, occasionally with some of the branchlets coiled round the supports. *Leaves*

alternate, bifarious ; stipules small, caducous. *Flowers* small, 2-sexual, bracteate, in axillary and terminal panicles. *Calyx* 5 fid, lobes spreading, keeled within. *Petals* 5, deltoid, hooded, spreading. *Stamens* 5, adnate to the base of the petals ; connective produced. *Disk* 5-lobed, filling the calyx-tube, *Ovary* 2-celled, globose, sunk in the disk ; style very short, bifid ; ovule one in each cell. *Fruit* a 1-celled 1-seeded nut seated on or partly enclosed by the persistent and adherent calyx tube and prolonged above into a linear-oblong coriaceous wing with a prominent midrib and crowned by the remains of the stigma ; seed subglobose, exalbuminous.

Leaves usually acuminate, glabrescent, with generally 6-8 secondary nerves ; nut girt by the calyx-tube below the middle, wing glabrous. .. 1. *V. maderaspatana*.
Leaves obtuse, velvety-pubescent with 4-5 secondary nerves ; nut girt by the calyx-tube round the middle, wing usually yellow-pubescent. ... 2. *V. calyculata*.

1. Ventilago maderaspatana Gærtn. Vern. *Riko-riubi*. Miri & Abor ; *Bor-kalia*, Ass. ; *Sher-kharuang*, Khasi (Bhoi).

A large woody climber with long sarmentose branches ; bark dark-grey, furrowed, red in the furrows, branchlets glabrescent. *Leaves* bifarious, 2.5-4 by 1-1.5 in., elliptic or oblong-lanceolate, crenate or crenate-serrate or nearly entire, thinly coriaceous, glabrous or glabrescent, turning yellow before falling ; lateral nerves 5-8 on either side of the midrib, slender, much arched ; tertiary nerves transverse to the midrib, very fine, close and parallel ; base more or less acute, subsymmetrical ; petiole .15-.2 in. long, channelled ; stipules small, subulate. *Flowers* small, fascicled in groups on large leafy pubescent panicles. *Calyx* puberulous outside, glabrous within, lobes keeled within with an incurved pointed apex. *Petals* spatulate, shorter than the calyx-lobes, enveloping the stamens. *Disk* glabrous or thinly pubescent. *Ovary* hairy at the base. *Nut* globose, about .2 in. across, girt by the calyx-tube below the middle ; wing 2-2.5 by .3-.4 in., oblong, thin, glabrous and shining, finely veined.

Low-lying places in UPPER ASSAM, e. g. the Majuli in SIBSAGAR, Gotonga in NOWGONG.

The bark of the stem gives good cordage fibre (Haines), and the root bark a dye (Gamble).

Flrs. 9-12. Fr. 12-4.

2. Ventilago calyculata Tulasne. Vern. *Ancham-chamkai*, Kuki ; *Mei-bynoh*, Khasi (Syl. border) ; also generally the names given to the foregoing species.

A very large woody climber ; branchlets grey-velvety, finely ribbed ; bark black, furrowed. *Leaves* 2-farious, variable, 2-5 by 1.25-2 in., elliptic ovate or oblong, bluntly short acuminate or obtuse, cuspidate-serrate, chartaceous, dark-green, glabrous and shining above, more or less velvety pubescent beneath along the midrib and nerves, yellow before falling ; lateral nerves 4-6 on either half, slender, much arched, tertiaries transverse, very close

and parallel; base unequally rounded and somewhat unsymmetrical; petiole 1-2 in. long, terete or imperceptibly channelled, hairy. *Flowers* small with a somewhat offensive smell, greenish-tomentose, very numerous in large dense terminal leaf-bearing grey velvety panicles. *Calyx* pubescent. *Petals* 5, tomentose, deflexed. *Disk* villous. *Nut* 2 in. across., globose, yellow or brown-pubescent, girt about the middle by the rim of the adherent calyx-tube; wing 2-2.5 by 3-4 in., strap-shaped, more or less pubescent with a strong straight midrib and 4-6 less prominent shorter veins parallel to the midrib.

Usually treated as a variety of the last species and more common than it generally in deciduous forests throughout the province up to about 1500 ft. in the hills.

Flrs. 12-1. Fr. 3-5.

2. SMYTHEA Seem.

Smythea calpicarpa Kurz. Vern. *Mai-ryn-nao*, Khasi.

A large woody evergreen climber; branches green with continuous vertical lines of grey lenticels alternating with obscure flutings; branchlets rusty tomentose, often cirriform. *Leaves* 2-farious, of two sizes,—ordinary 2-4.5 by 6-1.5 in., lanceolate, oblong or ovate-lanceolate, acuminate, often caudate, crenate serrate, serratures usually cuspidate, membranous but tough, dark-green and almost concolor on both surfaces, shining above, glabrous with age but usually with tufts of hairs on the axils of lateral nerves; lateral nerves generally 6-7 on the outer half and 5-6 on the inner, prominent beneath, converging upwards, tertiaries very close, transverse and parallel; base unsymmetrical, rounded on the inner half, subacute on the outer; petiole 1.5-2 in. long, terete. *Flowers* not seen, in fascicles or solitary? from the axils of reduced leaves (bracts?) at the ends of branches which are 6-1.5 by 2-5 in.; pedicels about 2 in. in fruit. *Calyx* 5-lobed, tube obconic, persistent. *Disk* filling the calyx-tube. *Stamens* 5, free; anthers didymous. *Ovary* immersed in the disk, 2-celled. *Capsule* 1-celled, 1-seeded, adnate at base to the calyx-tube, compressed above the seed, altogether 2-3 in. by 4-5 in., the compressed part oblong, minutely puberulous or glabrescent with a strong straight midrib, terminated by the remains of the style, and with 10-12 fine straight veins, parallel to the midrib; basal portion brown pubescent.

Southern slopes of the KHASI HILLS west of Shella up to 1200 ft.

Closely resembling *Ventilago* in foliage and habit.

Flrs. rains? Fr. 12-1.

3. ZIZYPHUS Juss.

Trees or shrubs, sometimes sarmentose, usually armed with stipular prickles. *Leaves* alternate, more or less 2-farious, usually coriaceous, palmately 3-5 nerved at the base. *Flowers* small, in

fascicles or in sessile or peduncled, sometimes paniced cymes. *Calyx* 5-fid; lobes spreading, keeled within. *Petals* 5, cucullate, deflexed, rarely 0. *Disk* 5-10 lobed, coating the calyx-tube; edges free. *Stamens* 5, often nestling under the hooded petals. *Ovary* 2-4 celled, sunk in the disk and often adnate to it at the base; styles 2-4, free or partially connate. *Fruit* a fleshy or dry drupe with a hard 1-4 celled and 1-4 seeded stone. *Seeds* somewhat compressed; cotyledons thick.

- I. Flowers fascicled or in sessile cymes. Leaves hairy beneath :-
 A tree or erect shrub; drupe orange or red when ripe. .. 1. *Z. Jujuba*.
 A scrambling shrub, drupe black when ripe. .. 2. *Z. Ænoplia*.
- II. Flowers in peduncled simple groups of cymes. Leaves glabrous or nearly so :-
 A tree. Calyx glabrous within. Petals 5. .. 3. *Z. incurva*.
 A shrub. Calyx hairy inside. Petals 0. .. 4. *Z. apetala*.
- III. Flowers in peduncled cymes disposed in large panicles :-
 A tree. Leaves felted beneath. Calyx puberulous within. Petals 0. Fruit terete. .. 5. *Z. rugosa*.
 (type).
 A scrambling shrub. Leaves not felted beneath; petals 0. .. *Z. rugosa*.
 (Var. *glabrescens*).
 A scrambling shrub. Leaves glabrous. Calyx glabrous within. Petals 5. Fruit compressed. .. 6. *Z. funicolosa*.

1. **Ziziphus Jujuba** Lamk. Sans. *Badari*. Vern. *Boguri*, Ass. & Miri; *Gange-asing*, Abor; *Thakri-arong*, Mik.; *Boroi*, Beng. (Cach. & Sylh.) also Kuki; *Thai-ganggi*, Kach.; *Theng-khi*, Garo; *Dieng-soh-broi*, Khasi.

A small tree usually up to 30 ft., in height and 4 or 5 ft. in girth, almost evergreen; bark dark-grey or on old stems nearly black with long vertical cracks, reddish and fibrous inside; young parts rusty tomentose. *Leaves* very variable, 1-3 by 1/2-2 1/2 in., obliquely elliptic-ovate or suborbicular, closely serrulate or entire, dark-green, glabrous and often shining above; densely rusty or grey-tomentose beneath, strongly three-nerved, nerves closely penniveined; base obliquely rounded; petiole 1/2-1 in. long; prickles solitary or in pairs, straight or one of a pair recurved. *Cymes* 1/2-1 in. across, axillary, nearly sessile. *Flowers* small, greenish yellow. *Calyx* glabrous within. *Petals* narrow, concave, reflexed, clawed. *Disk* 10-lobed. *Ovary* 2-celled; styles 2, united to the middle. *Drupe* 1/2-1 in. long, globose or ellipsoidal or obovoid-acuminate, with a fleshy, mealy aromatic acid or subacid pulp, red or orange when ripe; stone 2-celled, tubercled.

Fairly common throughout the plains and up to 2000 ft. in the GARO, KHASI and N. CACHAR HILLS, especially in a degraded form in which it is reduced to bushes.*

* The bushy form may be Var. *fruticosa* Haines. This is a shrub about 4 ft. high. *Leaves* ovate-suborbicular, stipular prickles in pairs both strong. *Fruit* globose, 3/4 in. across. This form never grows to a tree and often forms gregarious patches in grass lands. Further study in the field is necessary to definitely ascertain this.

Wood hard, compact, tough. reddish, weighing 43-52 lbs. per c.ft. Excellent for fuel and charcoal. Lac can be grown on the branches. The leaves are a good fodder for cattle and goats. The fruit is eaten and the bark is said to be useful for diarrhoea.

Flrs. 9-11. Fr. 12-2.

2. Zizyphus Cœnopia Mill. Vern. *Ingsu-dampo*, *Ingsu-damphu*, *Ingsu-rikang*, *Sudomphu*, Mik.; *Anor*, Beng. (Sylh.); *Sumuqujum*, *Thaigangi-jola*, *Thai-gangdi-hagra-biding-doukha*, Cach.; *Ral-ling-rang*, Kuki; *Ling-kemrang*, Tipp.

A bushy thorny shrub with long sarmentose branches; bark rough, dark-grey; branchlets 2-farious, somewhat zigzag. *Leaves* 2-farious, 1-2.5 by .7-1.4 in., ovate-lanceolate, acuminate, obscurely crenate serrate or subentire, nearly glabrous but somewhat harsh above, pale and softly brown pillose beneath, specially along the nerves, 3 sometimes 4 nerved from the base converging to very nearly the apex, side nerves inclined to the main nerves, subparallel; base slightly oblique; petiole .1-.3 in. long, pubescent; prickles solitary and recurved or in pairs when one is often pointed upward; on old stems often developing a broad pyramidal woody base. *Cymes* axillary, small; flowers pedicelled. *Calyx* about .1 in. long, tomentose outside, glabrous within; lobes keeled, broad ovate. *Petals* greenish-yellow, obtriangular, hooded, shorter than the calyx. *Disk* glabrous, 10-lobed. *Stamens* shorter than the petals and embraced by them. *Ovary* glabrous, 2-celled. *Drupe* .25 in. long, obovoid-globose, black when fully ripe; stone usually 1, rarely 2-celled, tubercled.

Fairly common in scrubby forests throughout the plains of both valleys and up to 2,000 ft. in the hills. Not reported from the LAKHIMPUR and N. E. FRONTIER DISTRICTS.

The roots are used medicinally, and the ripe fruit is edible.

Flrs. 9-10. Fr. 11-1.

3. Zizyphus incurva Roxb. Vern. *Dieng-chi-soh-Steing*, Khasi.

Usually a small tree but occasionally up to 80 ft. in height and 7 ft. in girth; bark grey or blackish, studded with horizontal lines of spines on raised woody pyramidal bases, brownish inside; young parts adpressed pubescent. *Leaves* 2-farious, 2-4 by 1-1.5 in., ovate-oblong, acuminate, serrulate or closely serrate, coriaceous, glabrous above, sparsely pilose along the main nerves beneath, unsymmetrically strongly 3-nerved from the base; lateral nerves often forked near the base, side nerves slender, arched; base oblique; petiole .3-.6 in. long, strigose, stipulary prickles 0 on large plants, solitary or in pairs on young plants, one being straight and the other incurved. *Cymes* about 1 in. long, peduncled, pubescent. *Calyx* hairy outside, glabrous within. *Petals* 5, slightly hooded. *Disk* 10-lobed with a pit at base of each lobe. *Ovary* 2-celled; styles 2, connate up to the middle. *Fruit* .4 by .3 in., ellipsoid, woody; stone usually unequally 2-celled.

KHASI HILLS not widely spread, common at Nongstoin 5600 ft., where it grows to be a fairly large tree.

Wood brownish, fine-grained, weighing 40 lbs. per c. ft.; pores evenly scattered, medullary rays very fine, capable of being used for turning.
Flrs. 5-6. Fr. 9-10.

4. Zizyphus apetala Hk. f. Vern. *Bon-boguri*, Ass.

A straggling shrub with rusty-tomentose switchy branchlets; bark blackish-grey with vertical lines of lenticels, 3 in. thick, peeling off when old exposing a reddish-green surface, red inside. *Leaves* 2.5-4 by 1.5-2 in., ovate-lanceolate, caudate-acuminate, sharply serrulate, thinly coriaceous, glabrous above, rusty-silky pilose along the main nerves beneath, 3-nerved from the rounded unsymmetrical base; side-nerves arched; petiole 3-5 in. long, finely channelled, sparsely hairy; stipulary prickles solitary, recurved, rusty-tomentose. *Cymes* 1-1.5 in. long; peduncles and ramifications densely rusty-tomentose. *Flowers* about .25 in. across. *Calyx*-lobes 5, about .1 in. long, ovate, densely hairy outside, minutely hairy within, faintly keeled. *Petals* 0. *Stamens* as long as the calyx-lobes; filaments glabrous. *Disk* 10-lobed, glabrous along the margin. *Ovary* 2-celled, conical, hairy; styles 2, united to above the middle, rarely (by abortion?) solitary. *Fruit* 1-celled, (immature) .5 in. long and broad, .25 in. thick, compressed, glabrous.

From Dirju in NORTH LAKHIMPUR to Pabhoi in DARRANG, not common.

Wood white. The ripe fruit is said to be eaten.

Flrs. 3-4. Fr. 4-6.

5. Zizyphus rugosa Lamk. Vern. *Bon-boguri* Ass. (Nowg.); *Dhidhao-boguri* Ass. (Darr.); *Bata-bakuri-arong* Mik.; *Tauling-asi-kur*, *Thai-gangni-hagra*-(gedeba), Cach.; *Khusuguchhi*, Aka; *Aker-tarug*, Duff.; *Wokner*, Kuki; *Khankhri-wakbuk*, *Thengkhi-makbil*, *Khongkhanimakbul*, *Dumakpul*, Garo; *Bhot-boguri*, *Jharua*; *Sumusram*, *Garosai*, Mech; *Bon-boroi*, Sylh.

A small armed deciduous tree with long straggling branches; young parts generally rusty-tomentose; bark dark grey or nearly black, deeply cracked into thick rectangular scales, somewhat soft and light pinkish-white; inside with distant strands of pure white, .5-.7 in. thick. *Leaves* 2-5 by 1.5-3.5 in., suborbicular-ovate or elliptic, closely serrulate, subacute, obliquely rounded or subcordate at the base, dark-green and glabrous above, densely grey or rusty-felted beneath; basal nerves three, lateral sometimes forked, each closely penninerved; petiole 3-5 in. long, stout, tomentose; prickles few, usually solitary, recurved with laterally compressed often pubescent base. *Cymes* arranged in long axillary or terminal panicles, which are often up to 1 ft. in length, sometimes leaf bearing, rusty tomentose throughout. *Flowers* .2-.25 in. across, yellowish green. *Calyx*-lobes ovate, orbicular, membranous, rusty-tomentose outside, puberulous within, not keeled. *Petals* 0. *Disk* 5-angled, thin, hairy. *Ovary* 2-celled, very hairy; styles 2, united below the middle. *Drupe* .3-.5 in. long, globose or pyriform, 1-celled, 1-seeded; stone crustaceous.

Throughout the province up to about 2000 ft. in KHASI HILLS.

The above description refers to the type which occurs in deciduous forests chiefly in the sal tracts of LOWER ASSAM and GARO HILLS.

Wood reddish, tough, weighing about 40 lbs. per c. ft. The ripe fruit is eaten.

Flrs 3-4.

Var. *glabrescens* Prain-differs by being generally scandent in ASSAM. *Leaves* narrower, not felted underneath. *Drupe*s larger. This variety is common in evergreen forests of UPPER ASSAM, specially SIBSAGAR. The fruit is edible but has very scanty flesh.

Flrs. 3-4. Fr. 5-7.

6. *Zizyphus funiculosa* Ham. Vern. *Bon-Boguri*, Ass. (Sib.); *Tatke-riubi*, Miri and Abor; *Ingsu-dompo*, Mik.

Generally a large, armed, scrambling shrub; young shoots rusty pubescent; bark dark-green, sparingly lenticelled, otherwise nearly smooth. *Leaves* 2-5 by 1-2 in., ovate or elliptic oblong, obtusely acuminate, finely crenulate, thinly coriaceous, glabrous, shining above, strongly 3-nerved and often with one or two slender additional costal nerves; lateral nerves with 5-10 strongly arched, slender branches towards the margins; tertiary nerves transverse, very close, parallel, with very fine reticulations between; base oblique; petiole 2-3 in. long, slightly channelled, prickles short, recurved, usually solitary. *Flowers* greenish-white, sweet-scented, in axillary and terminal pedunculate, panicked cymes; pedicels very short. *Calyx* rusty-velvety outside; lobes, slightly puberulous within, faintly keeled. *Petals* clawed, cucullate, spreading. *Disk* rather flat, obscurely 8-10 lobed, glabrous. *Ovary* 2-celled, glabrous; styles 2, connate only at the base, divergent. *Drupe* 5-7 in. long, obovoid, laterally compressed, furfuraceous-tomentose outside, yellow when ripe, with scanty flesh; stone 1-celled, crustaceous, fibrous outside.

Very common in evergreen forests in the FRONTIER DISTRICT, LAKHIMPUR and SIBSAGAR; also SYLHET, CACHAR and according to Hooker the KHASI HILLS.

The ripe fruit is eaten.

Flrs. 2-4. Fr. 5-6.

HOVENIA Thunb.

***Hovenia dulcis* Thunb.** The coral tree. Vern. *Chetia-bola*, Ass.; *Pike-asing*, *Sinke-laktok*, Abor; *Pinke-asing*, Miri; *Langta-krem*, Khasi; *Dieng-mylliat*, Synt.; *Bol-phukrum*, Garo.

A middle-sized unarmed deciduous tree up to 89 ft. in height and 6 ft. in girth; young shoots generally tomentose; bark green and smooth on branches, greyish white and fairly plain on very old trees, reticulately furrowed and brownish on adult trees, fibrous and reddish inside, often with concentric bands of brown or yellow and distant streaks of white, bright red underneath the cork. *Leaves* 4-7 by 2.5-4.5 in., somewhat obliquely ovate or elliptic to suborbicular ovate, long acuminate, sharply serrate, membranous, glabrescent above, more or less pubescent beneath along the nerves, 3 nerved at the base, the midrib pinnately

branched into 2-5 convergent secondary nerves on either side; the side ribs branched only on the outer side into 6-10 secondary nerves; tertiaries faint, transverse; base abruptly cuneate; petiole .5-1.5 in. long, slender, pubescent; stipules .1 in. long, lanceolate, deciduous. *Flowers* 2-sexual, white, about .2 in. across, in terminal and axillary peduncled 2-chotomously branched tomentose cymes, 1-3 in. long; peduncles and ramifications stout, pedicels very short. *Calyx* 5 fid; tube funnel-shaped; lobes elongate-triangular, faintly keeled. *Petals* 5, clawed, cucullate. *Stamens* 5, slightly exceeding the petals. *Disk* lining the *calyx-tube*; margin hairy. *Ovary* 3-celled, conical; style 3-fid at the apex. *Fruit* about .3 in. across, 3-celled, 3-seeded; pericarp coriaceous, separating from the thin papery whitish endocarp; seeds orbicular, .12-.15 in. across, plano-convex, black, shining. The peduncle and other parts of the inflorescence thicken into a fleshy mass when the fruit ripens, in which it then appears imbedded.

In the hills or on hilly ground up to 5,500 ft. Khairem to Charduar on the north bank of the Brahmaputra and from Margherita to Sonaikusi Reserve, NOWGONG on the south bank, also KHASI & GARO HILLS, N. E. FRONTIER & LAKHIMPUR; Shamuka Block, GOALPARA—Purkayastha. Not recorded from SYLHET, CACHAR.

The wood is dull-white, light, porous, not used except as fuel, the swollen peduncle etc. is sweet in fruit and is eaten.

Flrs. 5-6. Fr. 12-1.

5. BERCHEMIA Neck.

Berchemia floribunda Wall. Vern. *Tiw-ri-lang*, Khasi (Shill.); *Mei-rong-tom*, Khasi (Nongkhlaw).

A handsome unarmed climbing shrub; bark thin, green on branches, whitish outside on old stems, peeling off to expose a purple inner layer. *Leaves* 2-4 by 1-2 in., ovate or oblong, symmetrical, shortly but finely acuminate, entire or with a wavy margin, chartaceous, glabrous, rounded or slightly subcordate at the base; lateral nerves 10-12 on either half; straight and parallel, slender, but very distinct on both surfaces, inclined at a narrow angle to the midrib, tertiaries very fine and close, transverse, subparallel; often anastomosing; petiole .5-1 in. long, slender, terete; stipules intra-axillary, small, 2-fid. *Flowers* up to .1 in. across, 5 merous, fascicled on branches of very large terminal panicles, thinly covered with curled hairs; lower branches often from axils of reduced leaves; pedicels up to .1 in. long, buds globose, about .05 in. across, bracteoles small, broad, ovate, deciduous. *Calyx* 5-fid; lobes triangular. *Petals* 5, spatulate. *Disk* lining the calyx tube, margins free. *Ovary* sunk in the disk but free, 2 celled, narrowed into the 2-fid style. *Fruit* a fleshy drupe, seated on the calyx-tube, ovate-oblong or cylindrical, .3-.5 in. long, covered with a purple bloom; stone 2-celled, 2 seeded.

KHASI HILLS, 3-6000 ft., not very common. Chiefly in shady ravines.

Flrs. 7-9. Fr. 5-6.

6. SAGERETIA Brongn.

Straggling unarmed or spinescent shrubs; branches usually fluted or angular, opposite. *Leaves* mostly opposite or subopposite, penninerved; stipules small, deciduous. *Flowers* 2-sexual, 5-merous, sessile, in clusters supported by bracts, arranged in spiciform terminal or axillary panicles. *Calyx* cup-shaped; segments keeled inside, persistent. *Petals* 5, clawed, hooded. *Stamens* 5, as long as the petals. *Disk* cup-shaped; margin free, 5 lobed. *Ovary* 3-celled; styles 3, connate, short; stigma capitate. *Fruit* a drupe with 3 indehiscent 1-seeded pyrenes; cotyledons foliaceous; albumen thin.

Leaves glabrous, lateral nerves 6-10
on either half; panicles short,
often axillary.
Leaves pubescent beneath, lateral nerves
5-8 on either half; panicles
large, terminal.

... 1. *S. hamosa*.

... 2. *S. oppositifolia*.

1. Sageretia hamosa Brongn.

A woody straggling or bushy shrub; branches terete; branchlets angled, sometimes transformed into short straight or hooked spines. *Leaves* 1·5-3·75 by ·8-1·5 in., lanceolate or oblong, bluntly acuminate, closely and sharply serrate, thinly coriaceous, glabrous but sometimes with scattered hairs along the nerves beneath, dark-green and shining on both surfaces; lateral nerves 6-10 on either half, depressed above, very prominent beneath; tertiary nerves parallel and transverse; base rounded, symmetrical: petiole 2-4 in. long, finely channelled. *Panicles* 3-5 in. long, often with a few obovate, leaflike-bracts about 4 in. long, densely grey tomentose. *Flowers* small, in congested clusters. *Calyx teeth* triangular, erect, about 1 in. long, membranous, keeled inside, puberulous. *Disk* fleshy. *Drupe* about 25 in. long, obovoid, smooth, dark-brown, glaucous, with 2-3 pyrenes.

Only found so far in the KHASI HILLS 5000 to 5500 ft. e. g. Kynshi and Nongkersin.

Flrs. and Fr. 9-11.

2. Sageretia oppositifolia Brongn.

A shrub of the same habit and general appearance as the foregoing species. *Leaves* thinner, usually short, acuminate, sometimes subentire; lateral nerves 5-8 on either half, often subcordate at the base, more or less tomentose beneath, specially when young. *Inflorescence* mostly terminal, often running down into the leaves. *Flowers* in congested clusters. *Calyx* lobes exceeding the tube. *Petals* keeled on the back. *Drupe* turbinate about 25 in. long, succulent and black when ripe.

KHASI and NORTH CACHAR HILLS up to 2000 ft. not very common.

Flrs. Rains. Fr. Cold weather.

:7. RHAMNUS Linn.

Shrubs or small trees, usually erect, often spinescent. *Leaves* alternate, but in some species so close as to appear opposite or fascicled, serrulate. *Flowers* small, sometimes polygamous, in axillary clusters or panicles, rarely solitary; pedicels unequal. *Calyx* 4-5 fid; tube cup-shaped; lobes keeled within. *Petals* 4-5 or 0. *Stamens* 4-5, opposite the petals, inserted on the edge of the disk; filaments short. *Disk* thin, lining the calyx-tube. *Ovary* free, 3-4 celled, tapering to a 3-4 cleft style. *Fruit* drupaceous, generally black when fully ripe; stones obovoid; albumen fleshy.

Spinescent shrub or small tree; branches shining.

Flowers 4-merous.

Unarmed rambling shrub; branches not shining. Flowers 5-merous.

.. *R. virgatus*.

.. *R. nepalensis*.

1. *Rhamnus virgatus* Roxb. Syn. *R. dahuricus* F. B. I.

A shrub not exceeding 10 ft. in height in Assam, deciduous, generally with a stout spine at the forks of the branches; bark dark grey, thin, smooth, shining, peeling off in horizontal rolls. *Leaves* subopposite, opposite or fascicled on arrested branchlets, variable, 5-2.2 by 3-1 in., rhomboidal, obovate to ovate-lanceolate or narrow elliptic-lanceolate, acuminate, minutely serrulate to finely serrate, membranous, slightly pubescent beneath when young; lateral nerves generally 3 on either side of the midrib, rarely 2 or 4-5, slender, much arched, depressed above; tertiaries transverse, parallel, faint; base acute or cuneate; petiole 1.5 in. long. *Flowers* small, pale-green, 4-merous, unisexual, in dense axillary fascicles; buds pointed; pedicels filiform, long or short. *Calyx-tube* campanulate. *Petals* minute, spathulate. *Fruit* 1.5-2.5 in. long, globose; stones 2-4, dark brown, grooved, groove narrow, closed except near the bottom.

KHASI and JAINTIA HILLS, 4-5,500 ft., Kynshi, Nongkaseu, Nongspung, etc. generally on the outskirts of scrub forests.

Wood hard, fairly heavy and close-grained, capable of being used for agricultural implements. The fruit is very bitter and has emetic and purgative properties.

Flrs. 4-6. Fr. 9-11. Often fl. and fr. throughout the year.

2. *Rhamnus nepalensis* Wall. Vern. *Biringa*, *Biring-guli*, Ass.; *Biring-karing-asing*, Miri; *Nakaling-arong*, *Ringkang-uk-ik-arong*, Mik., *Midoubri-doukha*, Kach.; *Thelu-rikang*, N. C. Hills.

A bushy shrub with many long straggling branches; bark thin, blackish and more or less smooth outside, yellow inside, young shoots puberulous. *Leaves* 2-5 by 1-2.5 in., oblong, elliptic or ovate, abruptly short acuminate, serrulate, membranous, glabrous, dark-green and shining above, usually with tufts of hairs on the axils of lateral nerves beneath, yellow when old; lateral nerves 5-7 on either half, slender, slightly arched, tertiary nerves transverse, obscure; base more or less rounded; petiole

2-1 in. long, channelled. *Flowers* very small, green, fascicled in simple or paniced pubescent racemes, often with leaf-like bracts; panicle branches usually 1-2·2 in. long; pedicels 1-2 in. long. *Calyx* salver-shaped, small, tube persistent, accrescent. *Petals* oblong, concave. *Style* 3-4 cleft at the apex. *Drupe* 2-25 in. long, obovoid, dark-red when ripening, black when fully ripe.

Throughout the BRAHMAPUTRA VALLEY from Sadiya to Bijni, generally about streams. Also in the KHASI and JAINTIA HILLS up to 4000 ft.

Flrs. 10. In some localities 4. Fr. 11.

8. GOUANIA Linn.

Gouania leptostachya DC. Vern. *Jwarpat*, Ass.; *Ichhalot*, Sylh.; *Sanjari-bandeo*, *Dou-shrem*, Mech; *Dugithang*, *Dibok-pak-bidu*, *Lumigong*, Garo; *Jermei-ja-main*, *Mei-tein-iang*, Khasi.

An unarmed climbing shrub with grey bark bearing tendrils at the ends of the branchlets; branches glabrous; young parts and inflorescence pubescent. *Leaves* alternate, 2-4 by 1·5-2·5 in., ovate, acuminate, crenate, crenatures glandular, subcoriaceous, sparsely rusty-pubescent beneath when young; lateral nerves 5-6 on either side of the midrib, generally opposite, the lowest pair sub-basal and laterally branched; base rounded or subcordate; 3-1 in. long, slender, pubescent; stipules with persistent base and caducous apex. *Flowers* white, 15 in. across, in clusters on axillary or terminal, often leaf-bearing racemes, which are 6-12 in. long and usually unbranched. *Calyx* superior, 5-fid, keeled within at the apex. *Disk* 5-angled, angles produced into horn-like processes opposite the calyx lobes. *Petals* 5, inserted below the margin of the disk. *Stamens* 5, infolded by the petals. *Ovary* 3-celled, sunk in the disk; style 3-cleft. *Fruit* 5 in. long, 3-winged, 3-celled, 3-seeded, crowned by the remains of the calyx, separating into 3 1-seeded cocci through the wings; seeds somewhat laterally compressed, dorsally convex, polished.

Common in both VALLEYS and up to 2000 ft. in the GARO, KHASI and NORTH CACHAR HILLS.

Water mixed with bruised leaves is used for bath by patients suffering from fever.

Flrs. 8-10. Fr. 11-12.

FAM. 42. AMPELIDACEÆ.

Erect or climbing shrubs, the latter usually cirrhose, generally with copious watery juice; stems and branches nodose. *Leaves* alternate, simple-lobed, digitate or pedate, less often pinnate or 2-3-pinnate, stipulate; petiole thickened at the base. *Flowers* regular, 2-sexual or 1-sexual, in paniced, umbellate, corymbose or spicate cymes which are opposite the leaves or axillary; peduncles tendril-bearing or transformed into tendrils. *Calyx* small, entire or 4-5-toothed or -lobed. *Petals* 4-5, valvate, free or connate. *Disk* free or adnate to the petals, stamens or ovary. *Stamens* 4-5, opposite the petals, inserted at the base or between the lobes of the disk; filaments subulate; anthers 2-celled, introrse. *Ovary* 2-6-celled with 1-2 ovules in each cell; ovules anatropous; raphe ventral; style short. *Fruit* a berry, 1-6 seeded. *Seeds* erect; albumen cartilaginous, sometimes ruminant; radicle short, inferior.

Climbers, usually tendril-bearing; stamens free; ovary 2-celled; cells 2-ovuled.	..	1. <i>Vitis</i> .
Erect shrubs or herbs. Stamens connate at the base; ovary 3-6 celled; cells 1-ovuled.	..	2. <i>Leea</i> .

1. VITIS Linn.

Climbing shrubs or perennial herbs, sinistrorsely twining, usually with leaf-opposed tendrils. *Leaves* simple or 3-foliolate, or digitately or pedately 5-9-foliolate; stipules when present, adnate to the petiole, membranous. *Flowers* usually 2-sexual, sometimes polygamous, ebracteate in cymes disposed in racemes, corymbs, spikes, panicles or umbels. *Calyx* small, 4-5-toothed or -lobed, rarely entire. *Petals* 4-5, cohering at the apex or free. *Stamens* 4-5, inserted below the margin of the disk; anthers free. *Ovary* usually 2-celled with 2-ovules in each cell; style short or 0. *Fruit* berry-like, 1-2-celled. *Seeds* 2-4, with a hard testa; albumen—cartilaginous; embryo minute.

Planchon in his monograph in vol. V of De Candolle's *Monographiæ Phanerogamarum* divided *Vitis* up into a number of genera. As the entire group can be easily made out in the field, it has been kept in tact and arranged under one key for the convenience of Foresters in the field. The following is a key to the genera of Planchon into which the species described here mainly belong:—

- I. Fls. polygamous:—
 - A. Inflorescence usually bearing tendrils on the peduncles; stigma simple:—
 - Petals 3, usually calyptrae. Leaves simple. .. *Vitis*.
 - Petals 4-5, free. Leaves simple or digitate. .. *Ampelocissus*.

- B. Inflorescence not tendril bearing ; stigma 4-lobed :—
 Leaves 3-foliolate or pedately 5-7 foliolate, sometimes 2-1 foliolate by reduction. .. *Tetragastigma*,
- II. Flrs. hermaphrodite -
- A. Petals 5, less often 4, free or sometimes calyptrate ; style short ; stigma capitate. Leaves trifoliolate. .. *Pterisocissus*.
- B. Petals 4, at first connivent, then free :—
1. Leaves usually simple, sometimes 3-foliolate ; fruit 1-seeded. .. *Cissus*.
2. Leaves 3-foliolate, digitate or pedate ; fruit 2-4 seeded. .. *Cayratia*.
- I. Leaves simple often angled or lobed :—
- A. Flowers 4-merous, 2-sexual, in corymbose or umbellate cymes ; inflorescence not tendril bearing :—
1. Stem 4-winged, jointed, fleshy. .. 1. *V. quadrangularis*.
2. Stem not winged :—
- a. Leaves glabrous or nearly so :—
- i. Young shoots glaucous or mealy white. .. 2. *V. repens*.
- ii. Young shoots not glaucous :—
 Leaves variegated ; a slender climber. .. 3. *V. discolor*.
 Leaves not variegated ; a heavy woody climber. .. 4. *V. assamica*.
- b. Leaves more or less hairy :—
- i. Stem hard and woody, bark not corky ; leaves ovate, never broader than long ; dry seeds pitted with angled facets. .. 5. *V. adnata*.
- ii. Stem soft-wooded, bark corky, furrowed ; leaves broad-ovate to orbicular, sometimes broader than long ; dry seeds not faceted. .. 6. *V. repanda*.
- B. Flowers 5-merous, usually polygamous ; inflorescence tendril bearing :—
1. Large woody climbers :—
 Young shoots, peduncles and petioles with long glandular hairs. ... 7. *V. barbata*.
 Glandular hairs absent ; young parts tomentose. .. 8. *V. lanata*.
2. Climbers with herbaceous stems :—
- a. Extensive climber, leaves membranous, glabrous when mature. .. 9. *V. latifolia*.
- b. Trailing creepers with short annual stems :—
 Leaves persistently tomentose beneath ; inflorescence wooly. .. 10. *V. rugosa*.
 Leaves & inflorescence glabrous. .. 11. *V. sikkimensis*.
- II. Leaves usually 3-foliolate, rarely 5 or 1-2 foliolate ; inflorescence tendril bearing :—
 Flrs. polygamous, 5-merous. .. 12. *V. divaricata*.
- III. Leaves 3-foliolate ; inflorescence not tendril bearing :—
 Flrs. usually 4-merous ; rarely 5-merous :—
- A. Flrs. 2-sexual :—
 Stem fleshy, (except towards the base),

leaves pinnately 3-foliolate, leaflets more or less fleshy.
Stem woody, robust, leaves palmately 3-foliolate, leaflets coriaceous.

.. 13. *V. trifolia*.

.. 14. *V. semicordata*.

B. Flrs. polygamo-dioecious :-

1. Fruit turbinate or globose;
leaflets thin; stems slender :-
Cymes lax, on long peduncles;
flrs. pale yellow, minute;
stigma 4-lobed.

.. 15. *V. bracteolata*.

Cymes dense, almost sessile;
flrs. green not minute; stigma
peltate.

.. 16. *V. angustifolia*.

2. Fruit subfalcately oblong or oblong,
stem rather stout, softwooded with
corky furrowed bark, leaflets
coriaceous.

.. 17. *V. campylocarpa*.

IV. Leaves *digitately* 5-foliolate; stem more or less flattened; inflorescence not tendril bearing; flrs. 4-merous :-

A. Leaflets glabrous :-

Stigma undivided. Flrs. 2-sexual.
Fruit elliptic about 1 in. long,
1 seeded.

.. 18. *V. elongata*.

Stigma 4 lobed. Flrs. polygamo-
dioecious. Fruit globose, about
5 in. long, 1-2 seeded.

.. 19. *V. planicaulis*.

B. Leaflets fulvous pubescent; fruit
globose, about 5 in. across,
2-seeded.

.. 20. *V. obovata*.

V. Leaves mostly *pedately* 5-foliolate,
inflorescence tendril bearing; flrs.
4-merous :-

A. Leaflets glabrous :-

i. Slender climbers; leaflets thin :-

a. Leaflets chartaceous; cymes
umbellate :-

Tendrils forked near the apex :-
flrs. polygamo-dioecious.

.. 21. *V. capriolata*.

b. Leaflets membranous; cymes
corymbose :-

Cymes compact, usually short.
Flrs. polygamo dioecious. A
slender woody climber;
tendrils unbranched.

.. 22. *V. oxycphylla*.

Cymes lax, long peduncled.
Flrs. 2-sexual. A herbaceous
climber.

.. 23. *V. tenuifolia*.

ii. Heavy climbers; leaflets
coriaceous, branches warty :-

Fruit smooth; cymes short and
compact.

.. 24. *V. lanceolaria*.

Fruit with a distinct ring often
with minute tubercles below the
middle.

.. 25. *V. rumicispelma*.

[B. Leaflets pubescent, membranous;
branches slender; cymes lax; flrs.
2-sexual.

.. 26. *V. japonica*.

VI. Leaves mostly *pedately* 5-7 foliolate;
leaflets membranous, pubescent or
glabrate. Flrs. 2-sexual:

.. 27. *V. pedata*.)

VII. Leaves pinnately 7-11 foliolate ;
leaflets stalked, usually
pubescent.

.. 23. *V. rubifolia*.

1. *Vitis quadrangularis* Wall. Syn. *Cissus quadrangularis* Linn.
Vern. *Harjora*, *Harenga*, Beng.

Stem stout, fleshy, quadrangular and 4-winged, contracted at the nodes, dichotomously branched, climbing on tall trees or spreading on bushes, nearly deciduous. *Leaves* simple, 1-2 in. long and nearly as broad, cordate or reniform, sometimes 3-5-lobed, fleshy, entire or crenate-serrate, glabrous and smooth on both surface ; petiole short ; stipules moon-shaped, entire. *Tendrils* long, simple, leaf-opposed. *Cymes* axillary, umbelliform, shortly peduncled, small, glabrous. *Flowers* cymose, 4-merous, whitish. *Petals* 4, at first connivent, afterwards free. *Stamens* 4 ; filaments slender. *Disk* adnate to the base of the 2-celled ovary, erect ; style slender, short. *Fruit* .25 in. diam., globose, usually 1-seeded, succulent, red when ripe, very acid.

SYLHET and possibly also CACHAR.

The young shoots are eaten in curries and the juice of the stem has valuable medicinal properties.

Fls. 7-9. Fr. 11-1.

2. *Vitis repens* W. & A. Syn. *Cissus repens* Lamk. Vern.
Mei-hur-jarap, *Mei-ja-khajrap*, Khasi ; *Ja-jaw-chhrub*, Synt.

A handsome trailing glabrous plant ; young shoots succulent, red, covered with a white bloom, pleasantly acid. *Leaves* simple, 2-8 by 1.5-5 in., ovate, broadly cordate, acute, repand, often with a few distant cusps, pale-green, membranous, glabrous ; lateral nerves 3-4 on either half above the basal, arched ; petiole 2-3.5 in. long ; stipules small, rounded, glabrous. *Tendrils* 8-10 in. long, fleshy, usually forked. *Flowers* 4-merous, in compound few-flowered umbels ; peduncles 1-4 in. long, axillary ; pedicels slender, .5-1 in. long. *Calyx* truncate. *Petals* 1-1.5 in. long, triangular, ovate. *Style* conspicuous. *Fruit* globose, about .16 in. in diam., red but turning black when fully ripe ; generally 1-seeded ; seed globose, pyriform, albumen ruminant.

KHASI HILLS, 1-4,600 ft., generally in shady valleys, NAGA HILLS, also NORTH CACHAR HILLS-Phulertul and probably in hilly country in other districts.

The leaves and tender shoots are eaten cooked.

Fls. & fr. 11-1.

3. *Vitis discolor* Dalz. Syn. *Cissus discolor* Bl.

A weak glabrous climber with a woody base ; branches subangular, red and smooth, not glaucous. *Leaves* generally 2-5 by 1-3 in., ovate-lanceolate, acute or acuminate, base cordate to subtruncate bristly or crenate-serrate, membranous, glabrous, generally with irregular translucent white blotches on the upper surface, purple underneath ; lateral nerves 3-5 on either half above the middle, slender, arched ; petiole .3-1 in. long ; stipules

oblong, membranous and somewhat hyaline. *Tendrils* generally forked. *Flowers* 4 merous, in small compound puberulous umbels; peduncles leaf-opposed, scarcely exceeding .5 in. in length; primary branches .6-.8 in. long; ultimate pedicels .1-.2 in. long, very slender. *Calyx* truncate, fleshy. *Petals* .12 in. long, yellowish, glabrous, thickened at the apex. *Disk* 4 lobed. *Style* conspicuous, simple. *Fruit* reddish-purple to black. *Seed* as of *V. repens*.

NAGA HILLS, KHASI HILLS, 3-4,000 ft. also MANIPUR.

Fls. 6-9 Fr. 9-11.

4. *Vitis assamica* Laws. Syn. *Cissus assamica* Craib nov. comb.

A heavy rigid climber, glabrous except very young shoots branches sub-angular, woody. *Leaves* orbicular-cordate, suddenly acuminate, bristly serrate with margins recurved, subcoriaceous, strongly nerved beneath; tendrils simple. *Flowers* 4-merous, in axillary compound umbellate cymes, common peduncle .7-2.5 in. long, pedicels .15-.2 in. long, filiform. *Petals* distinct; style about .1 in. long. *Fruit* turbinate, about .25 in. long, 1-seeded, juicy, edible; seed .2 in. long, pyriform, smooth (in herbarium specimens*) with a continuous ridge from face to back.

ASSAM PROPER and CACHAR.

Planchon in his monograph (Vol. V, p. 495 De Candolle's *Monographiæ Phanerogamarum*) includes this plant under "*Cissus adnata* forma *glabrior*." The seeds of the plant described as *Vitis adnata* Wall. in F.B.I., are however very different to those of *V. assamica*; the two cannot therefore be grouped together.

5. *Vitis adnata* Wall. Syn. *Cissus adnata* Roxb. in part. vern. *Pani-lara*, Nep.; *Down-rang*, Kuki; *Bhatia-lot*, Sylh.

A long but slender climber with woody stem; branches, leaves beneath and inflorescence rusty pubescent. *Leaves* simple, 3-6 by 2-5 in., ovate-orbicular, cordate, shortly acuminate, bristly serrate, membranous, intricately rusty-tomentose beneath, glabrescent and dark-green above; basal nerves 3-5, lateral nerves 4-6 on either side of the midrib, above the basal, slender, only slightly arched, nerves excurrent into teeth; petiole .3-2 in. long; stipules oblong, more or less adnate, small, with a shining centre and a thin translucent margin. *Tendril* forked, woody. *Cymes* axillary, umbelliform, generally compound, more or less compact; common peduncle .5-2 in. long, bracteoles very small, caducous. *Flowers* 4 merous. *Petals* distinct, greenish-yellow, about .05 in. long, oblong-ovate, hooded, pubescent outside; style columnar. *Fruit* about .3 in. long, obovoid, black, smooth, 1-seeded, on recurved and thickened pedicels; seed obliquely pyriform, pitted with irregular polygonal depressions. †

Throughout the plains and up to 3,000 ft. in the hills, neither rare nor very common.

* According to Haines with flabellate scales in fresh specimens..

† According to Haines not evident in ripe fresh seeds

A decoction of the dried root-stocks is used in *W. India* as a diuretic and blood purifier.

Fls. 10-11. Fr. II-I.

Cissus dispersa Hutch. Syn. *C. latifolia*, Vahl. Vern. *Bhatiṭa-lot*, Sylh.

A woody climber with woolly innovations, branchlets slender; tendrils sometimes forked. *Leaves* 2-3.5 in. by 1.25-3 in., acuminate, nerves ending in fine teeth; glabrate above, more or less floccose-tomentose beneath; petiole 1-2 in. long, tomentose. *Flowers* 4-merous, in compound umbellate cymes, peduncles short, usually up to 1 in. long, usually leaf opposed. *Calyx* nearly truncate or lobes short. *Petals* thinly hairy outside; style long, subulate. *Young* fruits obovoid.

SYLHET—Kanjilal sheet No. 4679.

Lawson in F. B. I. had included this plant under *V. adnata*. Further examination is needed to confirm its specific rank.

6. Vitis repanda W & A. Syn. *Cissus repanda* Vahl. Vern. *Medmedia-lot*, Ass. (Sibs.); *Pani-bel*, Hind.

A large climber; young parts adpressed woolly; stem soft and very porous, reticulately corky when old. *Leaves* simple, 4-8 by 3-6 in., sometimes broader than or at least as broad as long, suborbicular, deeply cordate, 5-sometimes 7-angled or -lobed, dentate-serrate, shortly acuminate, membranous, glabrescent except on the nerves beneath with age, basal nerves 5, outermost pair branched from near the origin; secondary nerves 4-6 on either side of midrib above the basal, slender, slightly arched; petiole 3-5 in. long; stipules almost free, hairy, oblong, rounded, sometimes falcate, 2-3 in. long. *Inflorescence* leaf-opposed, lax, adpressed-hairy, repeatedly umbellately or subcorymbosely branched, the ultimate divisions being of about 20-flowered umbels; peduncle 2-5 in. long, ribbed, hairy; bracts and bracteoles woolly. *Flowers* reddish-brown, 1 in. long, 4-merous, bisexual; petals ovate, oblong, hooded, hairy at the apex. *Disk* 4 lobed. *Fruit* 3 in. long, pyriform, apiculate, 1-seeded. *Seed* pyriform, nearly smooth.

Common in the Sal tracts and other deciduous types of forests.

The stem when cut and detached, yields fairly large quantities of clear potable water which is of great help to workmen and way-farers in waterless tracts.

New leaves and flowers 4-5 Fr. 6-7.

7. Vitis barbata Wall.

A large climber with stout hollow branches easily recognized by the long glandular hairs on the young shoots, petioles and peduncles. *Leaves* 8-12 by 6-9 in., ovate-cordate, acute or acuminate, sometimes faintly lobed, distantly dentate, membranous, glabrate above, generally densely brown-felted-beneath; supra-basal lateral nerves 3-4 on either side of the midrib, the lowermost often forked from near the base; petiole 2-3.5 in. long, tomentose as well as bristly. *Inflorescence* of paniculate cymes laxly ovate in outline, 4-6 in. long; peduncles 4-8 in. long, flattened, glandular-hairy, usually with a long, slender, forked tendril from near its apex. *Flowers* sessile, generally 5-merous. *Fruit* elliptic, 4-6 in. long and 3-4 in. in diam., on short stout pedicels, 1-2-seeded; seed 3 by 1.5 in., somewhat compressed,

face wedgeshaped, grooved, back with a narrow oblong tubercle from which shallow fissures radiate to the margin.

KHASI HILLS up to 3,000 ft.

The fruit is palatable and is believed to be a possible new source of grapes.

8. *Vitis lanata* Roxb.

A large climber ; young parts succulent and generally densely tawny tomentose, old stem woody. *Leaves* simple, very variable in size and shape, generally 2-5 by 1·5-4 in., often as broad as long, sometimes attaining 8 in. or more in length, ovate-orbicular from a cordate or truncate base, acute or acuminate, serrate, often angled or lobed, membranous, generally pubescent or more or less laxly or tomentose with rusty-brown wool beneath, glabrate above ; basal nerves about 5, lateral nerves 4-7 on either side of midrib above the basal ; petiole terete, 1·5-4 in. long. *Tendrils* leaf-opposed, generally forked. *Inflorescence* a large paniculate cyme, subcorymbosely branched or thyrse-form, leaf-opposed ; peduncle often bearing a simple or forked tendril. *Flowers* small, green, 5-merous, polygamo-diœcious. *Petals* usually cohering at the apex. *Style* O. *Fruit* globose, succulent, 2-3 in. across, black or dark-purple when ripe, usually 1-2-seeded. *Seeds* about 16 in. long, ob-triangular, slightly emarginate with a spatulate tubercle on the back, face wedge-shaped, 2 furrowed.

Occurs in the KHASI HILLS, 4-6,000 ft.

The root of the plant is eaten, and the fruit of some varieties is edible.

Fls. 5-6. Fr. 9-11.

Var. *glabra* occurs in the Jawai Subdivision, e. g. at Puriem. It differs from the type in having nearly glabrous leaves and thinner stems. *Petiole* slightly pubescent and tufts of scales occur at the axils of the lateral nerves on the under surface of the leaves. *Seeds* up to 4 in each fruit.

Probably the same as *Vitis heyneana* Roem et Schult. as pointed out by Parker in Indian Forester Vol. LIX P 61-63. If this view is correct, this name being earlier should supersede Roxburgh's name.

V. vinifera Linn. The grape vine, belongs to this group of the genus, but the climate of ASSAM is too moist for its successful cultivation.

9. *Vitis latifolia* Roxb. Syn. *Ampelocissus latifolia* Planch. Vern. *Gowalia-lata*, Beng.

A far-climbing herbaceous climber with a perennial rootstock, branches striate, glabrous, smooth ; new shoots glaucous, often purplish at the nodes. *Leaves* 4-11 by 3·5-8 in., ovate, deeply cordate, usually 3-5-7-angled or—lobed, crenate-serrate, membranous, glabrous when mature, shining above, 5-7-nerved at the base ; lateral nerves 5-7 on either half above the base ; petiole about as long as the blade, terete, smooth. *Inflorescence* up to 4 in. long of a compact, ovoid, dense, cyme-bearing panicle on a stout tendril-bearing peduncle. *Flowers* small, reddish-brown, 5-merous, polygamous. *Petals* free, oblong, reflexed. *Style* O. *Berry* about 35 in. long, ellipsoid, black when fully ripe,

usually 2-seeded. *Seed* with margins transversely rugose and a blunt ridge on the face.

The plains of both Valleys, also the KHASI and MIKIR HILLS up to 4,000 ft., generally in village scrub.

Fls. rainy season. Fr. 10-11.

10. *Vitis rugosa* Wall (*non* *V. rugosa* Hk.f. et Th = *V. nervosa* Laws). Syn. *V. macrophylla* Madden, *Ampelocissus rugosa* Planch.

A climber usually trailing on the ground, attaining up to 10 ft. *Stem* annual, soft, fairly stout, from a perennial thickened root-stock, reddish with longitudinal furrows, dotted with raised lenticels; young shoots covered with rusty wool. *Leaves* 5-18 in. or more across, suborbicular, orbicular or sometimes broader than long, shallowly 5-7 lobed, lower lobes somewhat obscure, margin sinuate, shortly toothed, more or less pubescent above, densely felted beneath with rusty or brownish tomentum; base deeply cordate, 5-nerved, basal portion of the lowest pair along the sinus and then forked, nerves depressed above, raised beneath; petiole 2-9 in. long, red, stout, striate. *Flowers* small, reddish, 5-merous, in short, leaf opposed, cymose pedunculate panicles of cymes, 1-5 in. long, usually with a bifurcate tendril on the peduncle. *Inflorescence* floccose-tomentose, with stout branches, pedicels very short, stout; petals free. *Berry* 3-4 in. across, black when ripe; seeds 1-4, with a sub-elliptic pit on the back from which fine, short, depressed lines radiate and a broad ridge on the face.

KHASI HILLS on sunny slopes in the open about 4-6000 ft., not common.

The subacid fruit is edible.

Fl. 6-7. Fr. 9-11.

11. *Vitis sikkimensis* Laws. Syn. *Ampelocissus sikkimensis* Planch. Vern. *Jermei-sheo-shao*, Khasi.

Stem weak, trailing, glabrous; young parts often glaucous. *Leaves* with reddish tinge, up to 18 in. across, orbicular-ovate, deeply rounded-cordate, cuspidately denticulate, somewhat abruptly acuminate, membranous, glabrous; petiole 4-6 in. long, tendrils branched. *Inflorescence*—a panicle of umbellate cymes; peduncle 4-5 in. long with a forked tendril a little below the apex; ramifications divaricate, sub-succulent in fruit. *Flowers* 5-merous; petals free. *Berry* 2 in. long, obovoid, 2-seeded, seed with a spatulate tubercle on the back.

KHASI HILLS up to 5500 ft.—Nongstoin, Shillong, etc.

Fls. 7-8. Fr. 9-10.

12. *Vitis divaricata* Wall. Syn. *Ampelocissus divaricata* Planch.

A much spreading climber with thin round stem, branches with a shining reddish cuticle under a fugacious coat of down; bark fibrous, young parts woolly greyish or rufous tomentose.

Tendrils leaf-opposed 6-10 in. long, forked towards the end. *Leaves* 3-foliolate, rarely 5-foliolate, or 1-foliolate; common petiole 3-4 in. long, stout. *Leaflets* 4-6 by 1.5-3 in., variable, terminal, elliptic to lanceolate; lateral oblique and semicordate, finely acuminate, cuspidate dentate, subentire or sometimes lobed, membranous, glabrate above, more or less softly rusty-pubescent beneath; lateral nerves 9-10 on either half, slender, much-arched, mostly opposite or subopposite, tertiary nerves transverse; terminal petiole about 1 in. and lateral 2-3 in. long. *Flowers* 5-merous, polygamous, reddish-brown, in pubescent long-peduncled compact 2-3 cymose cymes. *Peduncle* up to 5 in. long, forked near the top into a long tendril. *Cyme* branches divaricate with linear bracts at the forks. *Petals* hooded. *Disk* cupular, 10-pleated or lobed. *Style* short. *Berry* about .4 in. long, globose, ellipsoid, black when ripe. *Seed* flat, obovate or elliptic with a pit on the back from which fine grooves radiate, and a ridge on the face which broadens upwards.

Not uncommon in damp evergreen forests of UPPER ASSAM, e. g. Makum, Margherita, etc.

Fl. 6(?) -9. Fr. 10-12.

13. *Vitis trifolia* Linn. Syn *V. carnosa* Wall. *Cayratia carnosa* Gagnepain. Vern *Chepeta-lot*, Ass.; *Takigokang*, Miri; *Amal-lata*, Beng.

A climber with soft stem which becomes flattened with age; young parts pubescent; shoots striate. *Tendrils* wiry, usually branched, often ending in adhesive disks. *Leaves* usually pinnately 3-foliolate—sometimes 2- or 1-foliolate by reduction; common petiole 1-4 in. long, somewhat fleshy, stipules scarious, about .4 in. long. *Leaflets* 2-6 by 1-4 in. long, terminal largest, lateral smaller, usually oblique, sometimes lobed on the broader side, ovate, obovate or elliptic, sharply or broadly acute; base cuneate or rounded, coarsely-toothed, rather succulent, glabrate or more or less pubescent on both surfaces; petiolules of lateral leaflets short. *Inflorescence* up to 8 in. long, leaf-opposed or axillary, of long peduncled, compound, pubescent cymes, initial branches of which are 2-3—sometimes 5 rayed—from the peduncle; peduncle as long as or longer than the petiole and about as thick. *Flowers* small, 2-sexual, 4-merous, greenish. *Calyx* subtruncate; petals free, hooded at the tips; disk 4-lobed, white, crenate; style subulate. *Berry* .3-4 in. long, obovoid or globose, apex depressed, crowned with the remains of the style, usually 2-4 seeded. *Seeds* trigonous, sharply angled and ridged on the face, sides compressed, back rounded, with a linear depressed tubercle.

Fairly common, specially in evergreen forests in UPPER ASSAM.

Flrs. 5-8 Fr. 9-12.

The plant is variable in habit. The stem is sometimes herbaceous and annual from a perennial base and is sometimes softly woody, though

succulent. In the evergreen types of forests it is often a large climber and is generally robust in all its parts. In its ordinary state on the other hand it has annual shoots from a perennial base.

14. *Vitis semicordata* Wall. Syn. *V. himalayana* Brand. *Parthenocissus semicordata* Planch.

A large climber with woody stem; young parts herbaceous, glabrous or slightly pubescent. *Bark* brown, rough, deeply furrowed, fibrous. *Leaves* 3-foliolate; common petiole 4-6 in. long, slender, often sparsely and patently pubescent. *Leaflets* subcoriaceous, glabrous and shining above, of a lighter colour and often pubescent along the midrib and nerves beneath, showing beautiful yellow, orange and red autumnal-tints before falling, sharply serrate, finely and often somewhat abruptly acuminate, secondary nerves 7-8 on either half, tertiary nerves very closely and finely reticulate; terminal leaflet 3-4 in. by 2-3 in., ovate, obovate or rhomboid; base cuneate, petiolule '3-5 in. long; lateral very oblique on short petiolule, outer half rounded or semicordate, inner acute at the base. *Tendrils* branched, ending in adhesive disks or sometimes 0. *Flowers* yellowish-green, 2-sexual, 4-merous or 5-merous, in 4-6-flowered umbels which are borne on 3-sometimes 2-chotomously branched terminal or leaf-opposed panicles, 2-4 in. long; buds '15 in. long, ovoid-oblong; calyx salver-shaped. *Petals* ending a conical hood, reflexed when the flower opens. *Style* short, stout, red. *Berry* globose the size of a pea, 4-seeded, black when ripe; seeds smooth, black.

KHASI and NORTH CACHAR HILLS 2-6,500 ft., NAGA HILLS.

The wood has a pretty silver-grain and can be used for picture-frames and such other purposes.

Fls. 5-8. Fr. Cold season.

15. *Vitis bracteolata* Wall. Syn. *Tetrastigma bracteolatum* Planch. Vern. *Soh-mei-boit*, Khasi; *Duruje-doukha*, Cach.

A handsome vine with slender, wiry, glabrous, reddish, woody stem. *Leaves* 3-foliolate; common petiole 2-3.5 in. long, slightly swollen at the base. *Leaflets* 2-5 by 1.5-2.5 in., ovate or ovate-lanceolate, the lateral somewhat oblique, acute or acuminate, distantly cuspidate-serrate, membranous or thinly coriaceous, glabrous, puberulous or with curled hairs on the nerves beneath, main lateral nerves 5-10 on either side of the midrib, very slender, much arched; ending in serratures; base rounded or slightly cuneate; petiolules slightly puberulous, lateral '2-5 in., terminal '5-1 in. long. *Inflorescence* axillary, upto 4 in. long, of pubescent or puberulous, paniced, cyme-bearing corymbs upto 3 in. long with divaricate ramifications. *Flowers* 4-merous, dioecious, whitish, very small on short filiform pedicels, pubescent outside. *Petals* distinct. *Style* 0; stigma 4 lobed. *Berry* '2-2.5 in. diam., globose, black when ripe, 1-3-seeded. *Seeds* more or less horizontally wrinkled with two ridges on the back between which is a linear furrow and dotted all over the minute yellowish raised dots.

Throughout the plains of the Province and upto about 2,000 ft. in the hills, generally in scrub forest.

Fls. 9-11. Fr. 1-2.

16. *Vitis angustifolia* Wall. Syn. *Tetrastigma Thomsonianum* Planch. Vern. *Nekung-riubi*, Miri.

A herbaceous climber with dark-coloured usually flattened stem. *Leaves* 3-foliolate; common petiole 2-3 in. long, glabrous; stipules ovate-oblong, about 15-25 in. long, coriaceous. *Leaflets* 3-6 by 1-1.5 in., lanceolate or elliptic-lanceolate, distantly serrate, acuminate, glabrous or puberulous on the mid-rib; main lateral nerves 5-7 on either half, slender. *Tendrils* simple, leaf-opposed, very slender. *Cymes* axillary, short—shorter than the common petiole, dense, usually very shortly peduncled, pubescent. *Flowers* 4-merous, diœcious, green. *Petals* free. *Style* 0; stigma large, flat, scarcely lobed. *Berry* globose, about .2 in. across, not juicy, 2-4 seeded. “*Seeds* furrowed on each face and transversely rugose on the sides”—Haines.

Not uncommon in the islands and along the banks of the Brahmaputra. Also found in SYLHET and the KHASI HILLS.

Tender stems and leaves, which are acid, are eaten cooked with fish.

Fls. 9-10. Fr. 12-1.

17. *Vitis campylocarpa* Kurz. Syn. *Tetrastigma Parkeri* Gagnep. ? Vern. *Tusram-doukha*, Kach.; *Bepui-rhui*, Lush.

A heavy fleshy climber with terete stems; old stems soft wooded with corky, furrowed bark; branches smooth. *Leaves* digitately 3-foliolate, sometimes up to 6-foliolate; common petiole 2-4 in. long, stout. *Leaflets* 9.5-7 by 1.3-4 in., the terminal elliptic, ovate or obovate, lateral narrower, very oblique-sometimes almost falcate, acuminate, distantly cuspidate-serrate, entire towards the base, coriaceous, main lateral nerves 4-8 on either side of the midrib, upper ending in serratures, much arched, blade articulated with the petiolule; petiolule of the terminal leaflet up to 1 in., of the lateral leaflets .3-.75 in. long. *Tendrils* leaf-opposed, stout. *Flowers* 4-merous, diœcious, small in shortly peduncled, dichotomously branched axillary subcorymbose pubescent, compound cymes up to 3 in. long; pedicels stout, very short; buds pubescent, narrowed to a truncate apex from a broad base. *Male flowers* not seen. *Style* 0; stigma large, 4-lobed. *Fruit* about .6 in. long, oblong or ellipsoid, slightly curved, smooth, glossy, usually 1-seeded. *Seed* conforming to fruit if 1-seeded, transversely striate, with a groove on the face and another almost continuous one on the back, the latter with a low broad ridge.

Fairly common in the evergreen types of forests in UPPER ASSAM and SURMA VALLEY, especially in the vicinity of hills.

Fls. 11-12. Fr. 3-5.

I am unable to distinguish this from *Tetrastigma Parkeri* of Gagnepain. ms.

18. *Vitis elongata* Kurz. Syn. *Cissus elongata* Roxb. Vern. *Jermei-sein-iong*, Khasi

A robust climber with round or slightly flattened thick fleshy stem, quite glabrous. *Leaves* digitately 5-foliolate; common petiole 4-7 in. long, stout, swollen and with a callosity at the base. *Leaflets* 6.5-10 by 2.5-5 in., obovate-elliptic or oblong acuminate, outermost oblique, distantly minutely cuspidate-serrate, membranous, quite glabrous; lateral nerves 8-10 on either half, slender, arched, tertiary nerves obscure, distant; base attenuate to the petiolule or cuneate, petiolule margined, .5-1.5 in. long. *Tendrils* leaf-opposed, up to 12 in. in length. *Flowers* 4-merous, 2-sexual, at first in umbels which are borne on 2-chotomously branched cymes. *Style* short, subulate. *Fruit* ellipsoid, 1 in. long, 1-seeded. *Seed* .7 in. long, smooth.

Foot of the KHASI HILLS along the SYLHET border, chiefly along edges of ravines. Also Negheriting, SIBSAGAR-Clarke.
Fls. 5-6. Fr. 7-8.

19. *Vitis planicaulis* Hook. f. Syn. *Vitis neurosa* Kurz.
Vern. *Kerkeri-lata*, *Panilata*, *Chepeta-lata*, Ass.; *Turje-doukha*, Cach.; *Rikang-thipu*, Mik.; *Samarang*, Garo; *Soh-lar-pung*, Khasi; *Charchare-lata*, Nep.

A far-reaching large climber; stem soft, much flattened, especially at the base, wholly glabrous except the inflorescence, *Leaves* digitately pentafoliolate; common petiole 3.5-8 in. long. *Leaflets* 3.5-8 by 1.5-3 in., elliptic or elliptic to oblong-lanceolate, lateral oblique, acuminate, distantly cuspidate-serrate, membranous or sub-coriaceous, glabrous; petiolules .1-4 in. long. *Tendrils* leaf opposed, simple. *Flowers* greenish-yellow, 4-merous, sweet scented, in umbels which are borne on a pubescent corymbosely or divaricately branched congested axillary panicle; peduncles .2-1.5 in. long, stout, branches flattened; pedicels slender, up to .15 in. long; buds pubescent, ovoid, truncate at apex. *Flrs.* 4-merous, green; stigma 4-lobed. *Fruit* .6-.8 in. across, globose, succulent, 1-2-seeded. *Seed* .4 by .25 in., whitish, oblong, obovoid, transversely ribbed, with a linear-oblong depressed ridge on the back continuous on the other side but cuneate towards the apex.

Throughout the province chiefly in evergreen forests.

The stem when cut exudes profuse potable sap which the Garos also use to stop bleeding.

Fls. 4-5. Fr. 10-12.

20. *Vitis obovata* Laws. Syn. *Tetrastigma obovatum* Gagnep.
Vern. *Taka-pokang*, Miri; *Soh-lar-pung*, Khasi.

A heavy climber with flattened stem. *Leaves* 3-5 foliolate; common petiole 4-6 in. long, covered with curled brown hairs; petiolules .6-1.5 in. long, hairy like the petiole. *Leaflets* 6-8 by 3-5 in., obovate or elliptic, shortly acuminate, subentire or distantly crenate-serrate, membranous, glabrous above, more or less pubescent, especially along the nerves beneath; lateral nerves 7-8 on either half. *Tendrils* opposite leaf or inflorescence.

generally simple. *Inflorescence* shortly peduncled, corymbose, 3-chotomously branched. *Flowers* not seen. *Fruit* somewhat elongately globose, '6-'8 in. long, 1-3-seeded. *Seeds* '4-'5 in. long, ellipsoid, plano-convex or rounded on the back and wedge-shaped on the face, transversely lined with slender furrows, with a depressed linear oblong ridge on the back which is cuneate towards the apex and continuous on the other side.

Fairly common in evergreen forests in UPPER ASSAM and in shady ravines in the KHASI HILLS, ; ascending to 4,500 ft., Sadiya. Lokpur, Barpani, closely allied to the last species.

Fr. 10-1.

21. *Vitis capriolata* Don. Syn. *Tetrastigma serrulatum* Planch. Vern. *Mei-soh-mynjiriang*, Khasi; *Jermai-slang-ruin*, *Jermai-sara-boj*, Synt.

A wiry climber wholly glabrous, often trailing on the ground. *Leaves* pedately 5-foliolate; common petiole '5-2'5 in. long. *Leaflets* very variable in size and shape, '6-3 by '5-1'5 in., rhomboid to lanceolate, terminal largest, outermost lateral pair smallest and often oblique, finely often cuspidately-acuminate, sharply cuspidate-serrate, membranous or chartaceous; lateral nerves 5-10 on either half, tertiary nerves almost invisible; lateral petiolules '1-'15 in. long; ultimate petiolules extremely short or 0. *Stipules* short, persistent. *Tendrils* slender, generally divided near the extremity, often ending in adhesive disks. *Inflorescence* a compound peduncled umbellate cymes generally axillary or at the extremities of short lateral branches, erect or suberect, 2-3 in. long; bracts scarious, conspicuous; primary peduncles '3-1 in. long. *Flowers* 4-merous on slender pedicels, '2-'3 in. long. *Petals* somewhat thickened at the apex, into a short horn. *Style* 0; stigma flat, spreading, 4-lobed. *Fruit* globose, about '4 in. across, 2-4-seeded, black when ripe, edible. *Seeds* obovoid, rounded and with a linear tubercle on the back, flattened on the face, transversely wrinkled.

KHASI HILLS up to 6,000 ft., GARO HILLS.

Fl. 8-10. Fr. 12-3. The stem often develops adventitious roots.

22. *Vitis oxyphylla* Wall. Syn. *V. dubia* Laws. *Tetrastigma dubium* Pl. Vern. *Soh-mei-boyet*, Khasi; *Dhau-la-dousrem*, Mech.

A slender sinistrorsely-climbing glabrous shrub; older branches striate, warty. *Leaves* pedately 5-foliolate, often 4-3 foliolate by suppression of one or two of the lateral leaflets; common petiole 1-4 in. long, lateral '1-'4 in. long. *Leaflets* 2-8 by '7-2'5 in., terminal largest, outermost pair smallest and usually oblique, elliptic to ovate lanceolate or oblanceolate, bluntly long-acuminate, inciso-serrate, membranous or subcoriaceous, glabrous; lateral nerves 7-10 on either half, arched-except the submarginal basal pair, slender. *Tendril* leaf-opposed, slender, simple. *Flowers* 4-merous, polygamo-dioecious, pale-green, pedicelled, in compact,

axillary, peduncled compound corymbose cymes, .7-4 in. long. *Style* columnar, 4 lobed. *Fruit* globose, .3 in. across., black when ripe, 1-2-seeded. *Seeds* rugose.

Not uncommon in shady forests in the hills and their vicinity up to 5,000 ft in the KHASI HILLS (Shillong).

Fls. 2-3. Fr. 3-5.

In the Index Kewensis *V. oxypphylla* Wall has been made synonymou with *V. bracteolata* Wall. As King has pointed out in the Journal of Asiatics Society Vol. LXV page 113 that *Lawson's V. dubia* is exactly the same as *V. oxypphylla* Wall Cat. 6035 which, I have examined at Calcutta herbarium. The latter name must therefore supplant *V. dubia* Laws. *V. bracteolata* Wall Cat. 6023 is an allied but quite a distinct species.

23. *Vitis tenuifolia* W. & A. Syn. *Cayratia tenuifolia* Gagnep.

A graceful slender herbaceous climber, wholly glabrous. *Leaves* pedately 5-foliolate ; common petiole 2-4 in. long ; lateral petioles .2-.3 in. long, ultimate upto .1 in. long. *Leaflets* 1-3 by .7-2 in., ovate or lanceolate, acute or rounded, sharply cuspidate serrate, membranous. *Tendrils* leaf-opposed, short, slender, simple or forked. *Flowers* 4-merous, 2-sexual, in subcorymbose 2-chotomous, somewhat lax, axillary cymes ; peduncles 1-2 in. long, slender, bracteate ; pedicels about .2 in. long, filiform. *Style* short ; stigma large, peltate. *Fruit* turbinate-globose, 1-4-seeded. *Seed* convex and muricate on the back, ridged in the face.

KHASI HILLS (Shillong, 5,000 ft.) NAGA HILLS.

Fls. Cold season. Fr. 6-7.

24. *Vitis lanceolaria* Roxb. Syn. *Tetrastigma lanceolarium* Planch. Vern. *Tadi-ripun-riubi*, Miri.

A heavy climber with flattish woody stem, sometimes with raised transverse bars at intervals ; bark rough, brown and often tubercled, branches thick, often muricate with corky warts. *Leaves* pedately 5(-3)-foliolate ; common petiole 2-6 in. long, stout ; stipules about .5 in. long, oblong-lanceolate, pubescent, deciduous ; lateral petiolules .7-1 in., ultimate ones .3-.5 in. long, often pubescent. *Leaflets* 3-6 by 1-2-2.5 in., terminal largest, outermost pairs oblique, elliptic, oblanceolate to lanceolate, distantly cuspidate serrate, ovate or shortly acuminate, somewhat fleshy and coriaceous, glabrous ; lateral nerves 8-10 on either side of the fleshy midrib, arched, slender ; tertiary nerves invisible. *Tendrils* leaf-opposed, simple, stout. *Flowers* yellowish, about .1 in. long, dioecious, in axillary subcorymbosely compound, peduncled, compact pubescent cymes, 2-3.5 in. across ; female cymes fewer flowered and usually shorter than male cymes. *Petals* ovate-oblong, pubescent, corniculate at apex. *Style* 0 ; stigma shortly 4-lobed. *Fruit* .5-.7 by .3-.7 in., globose, smooth. *Seed* 1-2, with ruminated albumen, transversely wrinkled, back rounded with an elongate linear tubercle and face with a shallow forked groove.

Common in the FRONTIER DISTRICT, LAKHIMPUR, NAGA HILLS, SIBSAGAR and NOWGONG ; also occurs in evergreen type of forests in other DISTRICTS of both VALLEYS, ascending to about 3000 ft. in the hills.

The ripe fruit is eaten by the Meches of Goalpara, cooked with fish.
Fls. 2-4. Fr. 5-9.

25. *Vitis rumicisperma* Laws.

A large climber with cylindrical stem covered with corky warts or tubercles. *Leaves* pedately 5(-3)-foliolate; common petiole 1.5-4 in. long; lateral petiolules .3-.5 in., ultimate ones 0.1 in. long. *Leaflets* 2-5 by .7-2 in., terminal largest, outermost pair usually oblique and smallest, obovate to oblanceolate, usually finely acuminate, sharply serrate, coriaceous, glabrous; main lateral nerves about 12 on either side of the midrib, somewhat transverse. *Flowers* small, 4-merous, polygamo-dioecious, in repeatedly much branched pubescent, peduncled, axillary and terminal, subcorymbose, spreading compound cymes, usually 3-5 in. long; primary peduncles upto 2 in. long, appearing longer on account of suppression of leaves at the base; pedicels about .1 in. long. *Style* short; stigma 4-cleft. *Fruit* .2-.3 in. diam., usually 4-seeded, turbinate-globose, black when ripe, with a ring often with minute tubercles (indicating the disk?) below the middle, by which character as well as by its seeds this species is very readily distinguished from all its near allies. *Seeds* 1-4, about .3 in. long, triangular obcordate in outline, rugose across the sharp margins, back with an oblong tubercle in a shallow groove, face wedge-shaped, sharply ridged and with two fine grooves radiating at an angle on either side of the ridge.

KHASI and JAINTIA HILLS chiefly along the south face, 3,-5,000 ft.
The ripe fruit is edible.

Fls. 5-6. Fr. 7-9.

***Vitis Hookeri* Laws.**—A stout glabrous climber with cylindrical stem; branchlets glaucous, often warty. *Leaves* pedately 5-3-foliate; common petiole 3-5 in. long, thickened and with a callosity at the base; lateral petiolules .8-1 in. and ultimate petiolules .4-.6 in. long, stout, channelled. *Leaflets* 3-7 by 1.5-3.5 in., ovate, elliptic or oblong, bluntly acuminate, distantly crenate or sub-entire, coriaceous, glabrous; lateral nerves 6-10 on either half, slender, tertiary nerves indistinct. *Tendrils* leaf-opposed, simple, 8-10 in. long. *Flowers* 4-merous, in broad axillary corymbose cymes, on peduncles 3-5 in. long. *Fruit* 1 in. across, pulpy, 2-seeded. *Seeds* about .5 in. long, obovoid.

Reported as occurring in the plains of ASSAM and between 1-4000 ft. in the KHASI HILLS. There are however no specimens in Calcutta Herbarium from our area.

Fls. 9-10. Fr. Cold season (?)

26. *Vitis japonica* Thunb. *Incl.* *Vitis mollis*. Wall; *Cayratia japonica* Gagnep.

A slender climber, branchlets, inflorescence and leaves—specially on the undersurface—pubescent or hairy. *Leaves* pedately 5-foliate; common petiole .7-2.5 in. long; terminal leaflet 1.4-3 by .7-1.3 in., lateral smaller and more or less oblique, lanceolate, elliptic-lanceolate or oblong-obovate, acute or acuminate, rarely subacute, coarsely crenate-serrate; lateral nerves 4-7; tendrils leaf-opposed, at first slender, stouter with age, simple or forked. *Flowers* small, 2-sexual, in compound, subcorymbose cymes, peduncles 1.5-4.5 in. long; pedicels slender, .1-.15 in. long. *Calyx*

nearly truncate, pubescent outside. *Petals* 4, pubescent, specially towards the apex; disk lobes adnate to the ovary. *Ovary* 2-celled with 2-collateral ovules in each cell; style short, subulate. *Berries* obovoid, 2·3 in. long. *Seeds* trigonous, face sharply ridged, sides more or less excavate, back convex, rugose, marked with an elongated tubercle, and few subtransverse wrinkles.

CACHAR HILLS, S. LUSHAI HILLS, KHASI HILLS—Walong, Gauhati—*King's Collector!* Manipore, ascending to 4,000 ft. in the Hills.

Fls. 4. Fr. 5-6.

Closely resembles *V. tenuifolia* from which it can be readily distinguished by its hairiness. The terminal leaflet in some forms attain 4·5 by 2·5 in.

27. *Vitis pedata* Vahl. Syn. *Cayratia pedata* Juss. Vern. *Tusamphor-doukha*, Kach. ; *Uri-ising-thokphi*, Manip. (?) ; *Goalialata*, Beng.

A woody climber with cylindrical stem and striate branches. *Leaves* usually pedately 5-7-foliolate; common petiole 2-5 in. long, stout, fleshy, striate; lateral petiolules up to 1 in. long, ultimate up to 5 in., in length. *Leaflets* 3-8 by 1-3·5 in., elliptic to oblong-lanceolate, lateral very oblique, acuminate, crenate-serrate, membranous, often softly pubescent when young. *Tendrils* leaf-opposed, slender, repeatedly forked. *Flowers* 2-sexual, usually 4-merous, very small, greenish, pubescent, in axillary cyme-bearing corymbs about as long as the petioles; pedicels capillary. *Fruit* 3·4 in. across, depressed-globose, 4-seeded. *Seeds* small, hemispherical and concave, with a thin membrane on the concave side.

Fairly common in the plains and up to about 2,000 ft. in the hills.

The leaves are often used as a domestic remedy on account of their astringent properties.

Fls. 5-8. Fr. Cold season.

28. *Vitis rubifolia* Wall.

A large climber with slender 4-angular branches; young shoots rusty-pubescent. *Leaves* simply pinnate, 7-11-foliolate; rachis 5-9 in. long, pubescent. *Leaflets* opposite, 2-3·5 by 1-2 in., ovate to lanceolate with rounded or cordate base, finely acuminate, coarsely but regularly dentate-serrate, membranous, glabrous and green above, reddish and puberulous beneath; lateral nerves about 7 on either side of the midrib, opposite or sub-opposite, each usually terminating in a serrature on the margin; petiolules 0·5 in. long, pubescent. *Tendrils* forked, often wanting. *Flowers* small, greenish, in subcorymbosely arranged umbellate cymes, 5-7 in. long. *Fruit* depressed, globose, about 2 in. across, red, turning black when fully ripe. *Seeds* small, obovoid, back with a spatulate tubercle, margins transversely rugose, face wedge-shaped.

Joboka and adjoining parts in SIBSAGAR, Prains Collector! also southern faces of the KHASI HILLS, e.g. ; near Jaintiapur; NAGA HILLS, possibly in many other similar localities.

Fls. 8-10. Fr. 10-1.

2. LEEA Linn.

Stout fleshy erect herbs, shrubs or small trees, usually with a large pith; branches furrowed or striate. *Leaves* alternate, usually large, simple or more commonly variously pinnate; petiole sheathing. *Tendrils* 0. *Inflorescence* subterminal or leaf-opposed. *Flowers* small, red, yellow, white or greenish, in corymbose cymes. *Calyx* 5-lobed. *Petals* 5, connate at the base and adnate to the staminal tube, induplicate-valvate and hooded in bud, revolute when fully open. *Stamens* 5, united at the base into an entire or 5-cleft staminal-tube; free ends of the filaments short, reflexed; anthers introrse, free or more or less connate in bud, dehiscing longitudinally. *Ovary* inserted at the base of the staminal tube, 3-6-celled with one ovule in each cell; style short. *Fruit* 3-6-celled, depressed-globose, lobed. *Seeds* wedge-shaped with testa folded and intruded into the albumen.

- I. Petals and inflorescence red :—
 - A. Leaves simply pinnate, petiole-winged :—
 - Leaflets sessile. .. 1. *L. alata*.
 - B. Leaves 2-pinnate, petiole not winged :—
 - Leaflets sessile. .. 2. *L. sp.*
 - Leaflets petioluled. .. 3. *L. acuminata*.
- II. Petals white or greenish; inflorescence not red :—
 - A. Herbaceous :—
 - Ordinary leaves simple*, very large. .. 4. *L. macrophylla*.
 - B. Undershrubs; secondary nerves 1 to each tooth :—
 1. Leaves usually 3-foliate. .. 5. *L. trifoliata*.
 2. Leaves variously pinnate :—
 - a. Stem and peduncle with crisped wings; secondary nerves continuous, each terminating in a serrature. .. 6. *L. crispa*.
 - b. Stem not winged; secondary nerves forked at the extremity, each fork terminating in a serrature. .. 7. *L. aspera*.
 - C. Shrubs or small trees, secondary nerves several to each tooth :—
 1. Leaflets glabrous, acute at the base :—
 - Small tree often stilted on ærial roots; leaflets oblong. .. 8. *L. umbraculifera*.
 - Semi-herbaceous shrub; stem not stilted; leaflets more or less ovate. .. 9. *L. sambucina*.
 2. Leaflets hairy, rounded or subcordate at base :—
 - a. Leaflets with peltate scales underneath. .. 10. *L. æquata*.
 - b. Leaflets without peltate scales :—
 - Inflorescence with numerous conspicuous persistent bracts. .. 11. *L. bracteata*.
 - Bracts not persistent or conspicuous .. 12. *L. robusta*.

1. *Leea alata* Edgew. Vern. *Bon-ou*, Ass.

A somewhat stiff undershrub with annual stem up to 5 ft. in height, glabrous but covered with elevated dots. *Leaves* simply

* Rarely one or two upper leaves are pinnate, the leaflets being very small.

impari-pinnate ; rachis margined ; common petiole 1-2·5 in. long, grooved, winged (not crisped) reddish ; stipules deciduous. *Leaflets* 5-9, usually 5, sometimes 3, sessile or very shortly petioluled, 6-12 by 2-3 in., oblong, oblong-lanceolate, generally acute, sharply serrate, coriaceous, glabrous ; lateral nerves 10-14 on either half, strong, almost straight, very slanting, tertiary nerves numerous, parallel and transverse ; base more or less rounded. *Inflorescence* corymbosely cymose, pubescent, reddish. *Peduncles* 2-7 in. long, subterminal, furrowed ; pedicels very short. *Flowers* red, small, numerous. *Anthers* connate. *Fruit* about ½ in. across, red, turning bluish-purple in ripening, succulent.

LAKHIMPUR DISTRICT, Mann! Probably SIBSAGAR and DARRANG, KAMRUP and low elevations in KHASI HILLS, NAGA HILLS.

The stem dies back annually to a woody base.

Fls. 7-8. Fr. 9-11.

2. *Leea* sp. probably *L. Wightii*. C. B. Clarke. in Trimen's Journal of Botany 1881, p. 105.

An undershrub up to about 6 ft. in height. *Leaves* 2-pinnate ; common petiole and rachis terete, not winged, glabrate ; pinnae generally 4. *Leaflets* 4-6 by 1·2-1·6 in., sessile, lanceolate or oblong-lanceolate, serrate, sharply acuminate, membranous, slightly hispid ; lateral nerves 8-12 on either half, generally opposite, slender, arched, tertiaries transverse, very fine, rather irregular, subparallel. *Inflorescence* and *Flowers* coral-red, flower-buds globose. *Fruit* not seen.

Guma Reserve-GOALPARA, sheet No. 7560. Material incomplete for satisfactory determination.

3. *Leea acuminata* Wall. Vern. *Bujion*, *Kath-thengia*, Ass. ; *Gangma-Sangop*, *Gangma-chi*, *Gangma-jachheng*, Garo ; *Dienglang-karnum-kynthei*, Khasi ; *Asra-jolu*, Mech ; *Uichokpa-khungru*, Tipp. ; *Phuphaira*, Sylh. ; *Charai-thengia*, Ass. (Kam.) also Mikir.

A robust herbaceous shrub up to 15 ft. or more in height, bifariously branched ; stem terete, annulate at the nodes, up to 3 in. diam. at base, with large pith and often with large thick aerial roots ; branches striated. *Leaves* very large, bifarious, 2-pinnate ; pinnae usually 2-pair, 3-7-foliate, rachis terete, glabrous ; stipules connate, 7-1·5 in., adnate to the petiole and auricled at the base. *Leaflets* 4-9 by 1·5-3·5 in., terminal leaflet of each pinna usually largest, ovate, elliptic-lanceolate or oblong-lanceolate, acuminate, serrate, coriaceous when fully mature, glabrous, shining on both surfaces, pink when tender, turning yellow and ultimately red before falling ; lateral nerves 8-10 pairs, opposite, much arched ; tertiary nerves transverse, subparallel ; petiolules usually 2-4 in., sometimes up to 7 in. long, *Corymbs* pubescent or puberulous, coral red ; peduncles usually 2·5-4 in. long, leaf-opposed ; pedicels very short ; buds globose.

Flowers crowded, coral red, about '1 in. across. *Fruit* '25-3 in. diam., orange red, supported by the persistent calyx.

Fairly common in grass-lands and glades throughout the PROVINCE, ascending up to 2,500 ft. in the KHASI HILLS.

The stems are used as substitutes for bamboos in building temporary huts in forests where no bamboo grows.

Flrs. 5-8. Fr. 9-2.

4. *Leea macrophylla* Roxb. Vern. *Pharun-barne*, Khasi ; *Dholsamudra*, Beng.

A perennial herb with switchy annual shoots 3-5 ft. long which generally die back in March-April to be replaced by new ones in May-June ; stem deeply sulcate. *Leaves* usually up to 3 only, almost always simple, 9-20 by 8-16 in., ovate-cordate, acute, dentate-serrate, coriaceous, glabrous and dark-green above, greyish puberulous or pubescent beneath ; midrib sharply keeled ; lateral nerves about 9-12 on either half, usually opposite, almost straight, each giving off 1-6 branches terminating in teeth on the margin ; petiole 2-3·5 in. long, stout, channelled halfway from beneath with large adnate stipules. *Flowers* polygamous, white, small, males usually in small sessile or shortly peduncled corymbs from the base of the puberulous peduncle of the female corymbs which are 8-12 in. long. *Staminal tube* entire or nearly so. *Fruit* depressed-globose, '25-33 in. diam., black when ripe.

Only found so far in the KAMRUP and KHASI HILLS Districts, chiefly in the neighbourhood of Barnihat.

The ripe fruit is edible. The root is reported to be a remedy for ring-worm and guinea-worm and is also applied as poultice on obstinate sores and on sprains.

Fls. 8-10. Fr. 10-3.

5. *Leea trifoliata* Laws.

A weak herbaceous plant with swollen joints up to 3 ft. in height. *Leaves* usually* 3-foliolate ; petiole sheathed at the base, winged above. *Leaflets* 3-6 by 1-3 in., elliptic-oblong or obovate, rather abruptly acuminate, cuspidate serrate or serrulate, membranous, slightly pubescent along the nerves, especially when young ; main lateral nerves about 10 on either side of the midrib, slightly arched ; lateral petiolules '2-4 in. long, terminal '8-1·5 in. long. *Gynes* small. *Anthers* distinct. *Fruit* dry, black when ripe.

Foot of the KHASI HILLS in KAMRUP, NAGA HILLS.

Fls. 5-6. Fr. 7-8

6. *Leea crispa* Willd. Vern. *Gangma-chhangoppa*, *Mangkhrom*, Garo ; *Soh-phyrnou-nar*, Khasi ; *Ban-chalta*, Beng.

A gregarious undershurb, 3-4 ft. high, which grows annually from a perennial root-stock, easily recognised by crisped wings on the branches and leaf-rachis, the last two sulcate between the wings ; young parts pubescent. *Leaves* pinnately 3-5-foliolate ;

* Sometimes a pair of much smaller leaflets are seen about the middle of the petiole, e. g., my sheet No. 5449.

common petiole short, stout. *Leaflets* 4-9 by 1.5-3.5 in., elliptic, obovate, to ovate-oblong or oblong-lanceolate, acute or shortly acuminate, coarsely serrate, generally rounded at the base, coriaceous, subglabrous, turning red before dying; lateral nerves about 18 on either side of the midrib, straight, parallel, minutely strigose beneath; tertiary nerves very fine, transverse, parallel, glabrous; petiolules .3-.5 in. long. *Corymbs* shortly peduncled, 1-2 in. across. *Flowers* pale-yellow; pedicels short; bracts small, persistent. *Anthers* distinct. *Fruit* .3 in. across, broader than long, glabrous, steel-grey when ripe, 5-6-seeded.

Very common in grass-lands, especially in the Sal-bearing tracts of the PROVINCE and up to 4,000 ft. in the KHASI HILLS. It helps the regeneration of Sal by ousting grass and preparing the soil for germination of seed.

Fls. 7-8. Fr. 10-12.

7. *Leea aspera* Edgew. Vern. *Soh-phyrnou*, Khasi; *Rahakhani-gangma*, Garo.

An annual but semi-woody plant sometimes attaining 15-20 ft. in height, often tufted. *Stem* striated and with longitudinal grey streaks; pith large. *Leaves* usually 2-pinnate, sometimes 1 or 3-pinnate; rachis glabrous. *Leaflets* 3-6 by 2-3.5 in., elliptic, oblong or ovate, finely caudate, rounded or subcordate at the base, strongly and often cuspidately serrate, membranous or sub-coriaceous, punctate, harsh above, pubescent on the nerves beneath; lateral nerves 15-18 on either side of the midrib, mostly opposite, lowest pairs basal, almost straight, parallel, tertiary nerves very fine, close, parallel, lateral petiolules .3-.6 in. long. *Cymes* axillary, corymbose, 2-4 in. long; often trichotomously branched; branches compressed. *Flowers* .2 in. across, light-green, slightly scented; bracts small, persistent. *Calyx-teeth* acute. *Petals* lanceolate. *Berries* .3 in. across, depressed-globose, 5-seeded, slaty-green, turning black when fully ripe.

Fairly common in deciduous forests and grass-lands, especially in LOWER ASSAM and the HILLS up to 4,000 ft.

Fls. 6-8. Fr. 10-12.

8. *Leea umbraculifera* C. B. Clarke. Vern. *Ahina*, Ass. (Darr.); *Gach-gangma*, Ass. (Kam.); *Hupai-ura*, Sylh.; *Rakkibaing-assing*, Miri & Abor; *Pandausa-baphang*, Kach.; *Dieng-shong-wiang-synrang*, *Dieng-shong-rieng-masi*, *Dieng-song-wi-ang*, Khasi; *Choptipli*, *Soptipli*, *Nampiru-chin*, Mik.; *Demboranglang-changnc*, Duft.; *Thi-phak-Khrong-bol*, *Gangma-jachan*, Garo; *Asra-jola*, Mech.

A small tree attaining 50 ft. in height; stem fluted at base, often stilted on crown of thick aerial roots; bark grey or brown and somewhat rough outside, red inside. *Leaves* 2-3-pinnate; common petiole purple, amplexicaul at the base, rachis channelled, glabrous, purple at points of insertion of the pinnae. *Leaflets* 3-8 by .8-2 in., oblong-lanceolate or oblong, strongly serrate, caudate-acuminate, rounded or subacute at the base, coriaceous,

quite glabrous, shining underneath, variegated with red brown and green before falling; lateral nerves 10-15 on either side of the midrib, generally opposite, much arched, tertiary nerves very fine, transverse, parallel; petiolules .2-2 in. long, rather slender. *Inflorescence* 4-8 in. long, terminal or subterminal, corymbose with puberulous ultimately glabrescent branches; peduncles ordinarily up to 4 in. long; pedicels upto .1 in. long. *Flowers* greenish-white, .2-.25 in. across. *Calyx* green, turbinate, lobes 5, rounded, persistent. *Petals* light-green, .16 by .08 in. lanceolate, spreading or recurved. *Disk* fleshy, light yellow, urceolate. *Anthers* sessile, cohering by their lower end, introrse; connective white. *Fruit* .25-.3 in. across, depressed-globose, rather obscurely 3-6-lobed.

Common throughout the PROVINCE, especially in evergreen type of forest.

Wood reddish-brown, hard and compact, weighing about 48 lbs. per c. ft.; medullary rays some very broad, others finer, not very close, pores large but scanty; annual rings distinct, liable to crack but takes a good polish, and quite ornamental in radial section.

Fls. 7-11. Fr. 12-2.

9. *Leea sambucina* Willd. Vern. *Kukurathengia*, Ass. (Lakh. & Sib.); *Dibadiang-asung*, Miri; *Riu-khong-pieng*, Khasi. Also most of the names applied to *L. umbraculifera*.

A semi-herbaceous shrub up to 15 ft. in height and 3-4 in. in diam., at base. *Leaves* 2-3 pinnate, rachis stout, glabrous. *Leaflets* 3-8 by .8-3.5 in., oblong, oblong to ovate or elliptic-lanceolate, sharply acuminate, glabrous, coriaceous when mature; lateral nerves 7-12 on either half, arcuate, forked near the margin, raised beneath, tertiaries fine, lateral petiolules .2-.5 in. long, terminal up to 1.5 in. long. *Flowers* greenish white, .25-.3 in. across in much branched (often from near the base) compact puberulous, subterminal corymbs up to about 4 in. long; peduncles up to 2 in. long. *Petals* lanceolate-oblong, spreading; anthers cohering at the base. *Berry* depressed, globose, .25-.3 in. across, obscurely 3-6 lobed, 3-6 seeded.

Common in evergreen forests.

The ripe fruit is said to be edible. It is very apt to be mistaken for young stages of *L. umbraculifera* from which it differs by its habit, somewhat broader and fewer nerved leaflets, shorter and stouter peduncles, broader panicles and larger flower buds.

Flrs. rainy season. Fr. winter.

10. *Leea æquata* Linn. Vern. *Dieng-soh-phyrru-iong*, Khasi (Kam. side).

A semi-herbaceous plant 8-10 ft. high, easily distinguished from its congeners by its harsh feel and by the peltate glands on the undersurface of its leaves; young shoots hispid pubescent. *Leaves* 1-3-pinnate, usually 2-pinnate; rachis terete, hirsute. *Leaflets* 3-9 by 1-2.5 in., oblong-lanceolate or lanceolate, sharply serrate, caudate, acuminate, more or less rounded at the base, membranous, hispid with scattered grey hairs above, hirsute along the nerves and with scattered round brown peltate glands

beneath; lateral nerves 8-18 on either side of the midrib, slender, arched, tertiaries sub-parallel, invisible on the upper surface; lateral petiolules 15-5 in., terminal 1-15 in. long, hirsute. *Inflorescence* subterminal or leaf-opposed, 3-4 in. long and as broad, glandular-hairy; peduncle often branched from near the base. *Berries* depressed-globose, 25-3 in. diam., 3-6-seeded, turning red and finally black in ripening.

Apparently not very common. Foot of the KHASI HILLS on the KAMRUP side.

Fls. 6-7. Fr. 10-12.

11. *Leea bracteata* C. B. Clarke. Vern. *Kumtin-toi*, Lush.; *Lang-kurnu*, Khasi.

A shrub up to 16 ft. in height and 2-5 in. in diam. at base; stem often rooting from the internodes; young shoots rusty pubescent. *Leaves* pinnate or bipinnate; rachis more or less pubescent; common petiole sheathing at the base and winged from there for a length of 2-5-4 in. *Leaflets* 9-15 by 2-5-6 in., ovate, elliptic or oblong lanceolate, crenate-serrate, caudate acuminate, rounded or subacute at the base, membranous or chartaceous; glabrous and green above, pubescent and of a coppery-brown colour underneath; lateral nerves 15-20 on either half, mostly opposite, slightly arched, prominent beneath; tertiary nerves transverse, wavy, very fine; lateral petiolules 2-4 in. long, stout, pubescent. *Inflorescence* 3-4-5 in. long and about as broad, congested, with bright red pubescent branches and numerous ovate or lanceolate subpersistent bracts 2-6 in. long. *Berries* 3-4 in. diam., depressed-globose, 1-5-seeded, black when ripe.

KHASI, NAGA and LUSHAI HILLS up to 4,000 ft., generally in shady forests and ravines.

Wood fairly compact and heavy, resembling *L. umbraculifera* in structure.

Fls. 5-7. Fr. 10-12.

12. *Leea robusta* Roxb. Vern. *Koulkar*, Lushai.

A semi-herbaceous shrub up to 10 ft. in height; branches rusty-tomentose. *Leaves* 2-3-pinnate; rachis rusty-tomentose. *Leaflets* 8-12 by 2-5-3-5 in., lanceolate, or oblong-lanceolate, caudate-acuminate, finely serrate, rounded or subcordate at the base, membranous, glabrous but sub-rugose above, softly rusty-pubescent beneath; lateral nerves 14-18 on either half, generally opposite, slender, arched, tertiary nerves transverse, wavy, about 06 in. apart, parallel. *Peduncle* and branches of inflorescence rusty-villous, bracts deciduous, anthers slightly united in bud. *Flowers* green; staminal tube white. *Berries* about 33 in. across, purple-black when fully ripe; depressed, globose, 4-6 seeded.

KHASI HILLS, 3-4,000 ft., not very common.

Fls. 7-8. Fr. 10-12.

FAM. 43. STAPHYLEACEÆ.

Trees or shrubs. *Leaves* alternate or (in the case of our only genus *Turpinia*) opposite. *Flowers* 2-sexual, regular, paniced. *Calyx* imbricate, 5-partite, hypogynous. *Petals* 5, imbricate. *Disk* complete, lobed. *Stamens* 5, inserted outside the disk and opposite the calyx-lobes; anthers introrse. *Ovary* of three carpels, free or (in our genus) combined; ovules 2 or more in each carpel; styles 3, short. *Fruit* a berry or capsule; seeds one or many in each cell, albuminous; embryo straight.

1. TURPINIA Vent.

Trees or shrubs. *Leaves* opposite, imparipinnate, stipulate. *Leaflets* opposite, stipellate, serrulate, generally shining, often more or less oblique at the base. *Panicles* terminal, often running down to the axils of the upper leaves, sometimes wholly axillary. *Flowers* whitish. *Filaments* flattened; anthers small. *Ovary* sessile, 3-celled. *Fruit* a 3-lobed and 3-celled berry. *Seeds* angular; testa shining.

Middle-sized tree. Leaflets generally 7. Panicles large, mostly terminal. *Fruit* over 1 in. in diam.

Large shrub or small tree. Leaflets generally 5.

Panicles small, generally axillary. *Fruit* scarcely 5 in. in diam.

.. 1. *T. pomifera*.

.. 2. *T. nepalensis*.

1. *Turpinia pomifera* DC. Vern. *Pani-letku*, Ass. (Lakh.); *Bon-keseru*, Ass. (Sib.); *Gobar-khutla*, Ass. (Darr.); *Mota-amari*, Ass. (Kam.); *Tukku-assing*, Abor; *Sidumbulli-assing*, Miri; *Thekjoai*, *Thekjoy*, *Khrang-arong*, Mik; *Piyu-nekphi*, *Takre-changne*, Duff. *Dieng-iong*, *Dieng-soh-sang-kei*, *Dieng-soh-long-anthri*, Khasi; *Thaisram-phang*, Kach.; *Kothamari*, Garo (Dambu); *Bol-dikim*; *Kulamari*, *Kothamari*, *Gongmajaching*, Garo; *Kala-dingart*, Mech.

A rather handsome small or middle-sized tree, sometimes attaining as much as 9 ft. in girth, generally with a gregarious tendency; crown narrow and conical until mature. *Bark* grey or brown, fairly smooth on young trees, 12-25 in. thick, horizontally wrinkled and vertically furrowed, whitish or dun-brown inside with strands of deeper brown or amber. *Leaves* usually 10-20 in. long, opposite, imparipinnate, wholly glabrous; rachis terete; stipules interpetiolar, triangular, caducous. *Leaflets* generally 7, often 5, rarely 9 or 3, opposite, 3-8 by 1-3 in., oblong-elliptic or ovate, acuminate, serrulate, acute or slightly rounded and usually more or less oblique at the base, coriaceous, glossy green above, pale beneath; lateral nerves 6-8 on either half, much arched, tertiary nerves fine, irregularly reticulate;

lateral petiolules '1-4 in. long, terminal 1-2 in. long; stipels subulate, caducous. *Panicles* up to 12 in. or more in length when terminal, 3-6 in. long when axillary, corymbosely much branched; pedicels short. *Flowers* about '2 in. across, minutely bracteolate. *Calyx* lobes unequal, ovate or elliptic oblong, deciduous, ciliolate, '1-15 in., obovate-oblong or oblong; styles 3, more or less connate. *Fruit* nut-like, '7-15 in. across, globose. *Seeds* without aril; albumen fleshy; embryo straight.

Ubiquitous in evergreen types of plains forest throughout the province, especially in damp localities, ascending to 3,000 ft. in the hills.

The leaves are used for cattle fodder. Wood whitish, soft, even-grained, weighing 30-35 lbs. per cft.,—not used except as firewood but might be found suitable for carved toys and cooper's articles.

Flrs. 2-3. Fr. 4-5.

2. *Turpinia nepalensis* Wall. Vern. *Dieng-ja-rasi*. Synt., *Dieng-ja-arthri*. Khasi.

Generally only a shrub, scarcely exceeding 20 ft. in height; bark grey, corky outside, '15 in. thick; light-brown inside with streaks of lighter tissue. *Leaves* usually 5-12 in. long. *Leaflets* scarcely more than 5, 2-5 by '8-15 in., elliptic, ovate or oblong, caudate-acuminate, closely serrulate, coriaceous, glabrous, concolor on both surfaces, not so shining above as in *T. pomifera*; lateral nerves 4-7, arched, very slender; base always acute, often cuneate. *Inflorescence* generally axillary, 4-7 in. long. *Flowers* not seen. *Fruit* globose, up to '3 in across., succulent when ripe, sweetish.

Above 4,000 ft., in the KHASI HILLS and possibly also the MIKIR HILLS. Mawmluh near Cherrapunji, Kyelong Rock, Mawsynrang etc.

Fr. 10-12.

This is undoubtedly a distinct species. The leaves and fruit are quite different, also the flowering and fruiting seasons.

FAM. 44. ACERACEÆ.

Trees or erect shrubs. *Leaves* opposite, simple, undivided or lobed; stipules 0. *Flowers* regular, polygamous. *Sepals* and *petals* isomerous, the latter sometimes wanting. *Disk* generally complete and annular or 0. *Stamens* 4-10, inserted outside or upon, very rarely inside the disk; filaments free. *Ovary* of 2 carpels, each 1-2 ovuled. *Fruit* of two indehiscent samaras; *Seeds* exalbuminous.

1. ACER Linn.

Generally the characters of the Family. *Leaves* (in the Assam species) undivided or 3-7 lobed. *Flowers* in terminal or axillary racemes or corymb. *Calyx* usually 5-lobed, deciduous. *Petals*

as many as the calyx-lobes, sometimes 0. *Disk* thick, annular or cup-shaped, glabrous; margin lobed. *Stamens* generally 8, inserted on the disk; filaments dimorphous being usually longer in the male than in the hermaphrodite flowers. *Ovary* usually 2-lobed, 2-celled, laterally compressed; style deeply 2-fid; ovules 2 in each cell. *Fruit* a double samara, indehiscent; wings large, shaped more or less like the blade of a *khukri* (cultrate), membranous, thickened at the back; cotyledons irregularly folded.

Petiole usually exceeding 1 in. in length:—

Leaves pale beneath; cymes pubescent.

.. 1. *A. oblongum*.

Leaves silvery-white beneath; cymes glabrous.

.. 2. *A. niveum*.

Petiole usually less than 1 in. in length:—

Leaves green beneath; cymes glabrous.

.. 3. *A. laevigatum*.

1. *Acer oblongum* Wall. Vern. *Dieng-soh-khru*, Khasi; *Dieng-ialeh*, Synt.

A middle-sized deciduous tree, often irregularly buttressed at the base; branches lenticelled; bark greenish-grey or brown outside, with short raised horizontal bars and shallow longitudinally reticulate furrows peeling in irregular thick flakes in older trees, 2-4 in. thick, inside light pink, in very thin concentric layers. *Leaves* often ternate on young stems, 2.5-6 by 7-2 in., oblong or ovate-lanceolate, acuminate, entire, chartaceous, glaucous beneath; lateral nerves 6-8 pairs; base sub-acute or rounded. 3-nerved; petiole 7-4 in. long, slender, terete, coral-red or green. *Flowers* 5-merous in terminal or leaf-bearing lateral corymbose panicles, 3-5 in. long, pedicels and calyx hairy. *Sepals* and *petals* 1 in. long, linear-oblong. *Stamens* 8, exserted; filaments glabrous. *Ovary* hairy. *Fruit* glabrous; nuts more or less angular; wings 1 by 5 in., contracted at the base, divergent but often overlapping by the inner edges, closely veined.

The KHASI & JAINTIA and NORTH CACHAR HILLS between 2,000 and 4500 ft., not uncommon.

Wood light reddish-brown, moderately hard, close-grained, medullary rays fine: weighing 45 lbs. per cft., suitable for agricultural implements and for turning into cups and bowls.

Flrs. Rainy season (?) Fr. 12-2.

2. *Acer niveum* Bl. Vern. *Mota-bhe*, Ass. (Lakh); *Nabar*, Kuki.

A shade-enduring tree, often attaining very large size; bark brownish-grey, shallowly reticulately fissured, dun-brown inside, reddish-brown with yellow reticulations underneath the corky layer. *Leaves* opposite, sometimes ternate or alternate, 4-9 by 1.5-3 in., oblong or elliptic acuminate, quite entire, coriaceous, dark-green and glabrous above, glabrescent and silvery-grey beneath; lateral nerves about 8 on either half often with shorter intermediate ones, conspicuous underneath, tertiary nerves strongly reticulate; base acute or slightly rounded; petioles 1-3 in. long, slightly swollen at the upper extremity. *Flowers* small, in racemose glabrous corymbs. *Stamens* 6-8, glabrous.

Fruit glabrous; cells not angular; wings about 1 in. long, constricted near the base, divergent, much veined.

Only found in the LAKHIMPUR DISTRICT along the NAGA HILLS boundary, in the neighbourhood of Jeypur and in CACHAR on the Bhuban Hills.

3. *Acer lævigatum* Wall. Vern. *Dieng-than*, *Dieng-soh-tyrkhum*, *Dieng-tyrthia-iong*, Khasi; *Dieng-ja-ryngam*, *Dieng-soh-tang-hi*, Synt.; *Thing-khim*, Lush.

A middle-sized deciduous tree with dark greenish-grey bark on trunks and larger branches and smooth green bark on branchlets; inside creamy-white to pale-yellow, granular, speckled with brown spots, somewhat bitter in taste. *Leaves* 2-6 by 1-2 in., ovate or oblong-lanceolate, acuminate, serrulate when young, undulate, glabrous but often pilose along the mid-rib and with tufts of silky hairs in the axils of the nerves beneath, chartaceous, turning pink before falling; main lateral nerves 6-9 on either side of the midrib, arched; nervules very closely reticulate; petiole .25-.75 in. long, finely channelled above. *Racemes* 3-5 in. long, lax, with very slender ramifications. *Sepals* 5, ovate or lanceolate. *Petals* 5, clawed, white, about .12 in. long. *Stamens* 5-8, glabrous, longer than the petals. *Ovary* hairy. *Fruit* glabrous; nuts elliptical, almost terete, reticulate; wings .7-1 in. long, divergent, tinged with red until mature, back fairly straight.

KHASI & JAINTIA HILLS, 3-6000 ft. Cherrapunji, Sohrarim, Jawai, Shampung, etc. not common but with a gregarious tendency where it occurs.

Wood white, hard and close-grained, weighing about 43 lbs. per c. ft., capable of being used as planks and scantlings.

Flrs. 3-4. Fr. 8-10.

FAM. 45. SAPINDACEÆ.

Trees, shrubs or rarely climbing herbs. *Leaves* alternate, pinnate or rarely 1-3-foliate, (opposite and digitate in *Æsculus*), exstipulate. *Flowers* usually polygamous, generally more or less irregular. *Calyx* 4-5-lobed or of 4-5 sepals, usually imbricate, rarely valvate. *Petals* 4-5 or 0, often with scales or tufts of hairs at the base within. *Disk* annular or unilateral, often lobed, sometimes wanting in male flowers. *Stamens* 4-8, rarely 10, generally inserted inside the disk. *Ovary* 1-4, usually 3-celled, often 3-lobed; ovule generally 1, sometimes 2 in each cell. *Fruit* capsular or drupaceous, sometimes lobed. *Seeds* often arillate with a large hilum; albumen 0; cotyledons curved or convolute.

- | | |
|---|------------------------------|
| I. Climbing herbs with tendrils and biternate leaves; unilateral disk and capsular fruit. | .. 1. <i>Cardiospermum</i> . |
| II. Erect trees or shrubs:— | |
| A. Leaves opposite, digitate; fruit a capsule. | .. 2. <i>Æsculus</i> . |

B. Leaves alternate, pinnate or 1-3-foliolate :—

1. Flowers irregular, disk unilateral or oblique :—

Fruit indehiscent, deeply divided into 3-1 lobes :—

Lobes of fruit globose :—

Leaves 3-1-foliolate. ... 3. *Allophylus*.Leaves pinnate. .. 4. *Dittelasma*.Lobes of fruit oblong. .. 5. *Erioglossum*.

2. Flowers more or less regular ; disk annular :—

a. Fruit capsular :—

Capsule not inflated ; ovules solitary. .. 6. *Cupania*.Capsule inflated ; ovules usually 2 in each cell. .. 7. *Harpullia*.

b. Fruit indehiscent :—

i. Fruit not divided :—

Calyx widely imbricated, petals 5-4, fruit trigonous. .. 8. *Lepisanthes*.Calyx subvalvate ; petals 0 ; fruit ovoid. .. 9. *Schleichera*.

ii. Fruit divided into 3-1-lobes :—

Fruit not muricated or tubercled, pericarp fleshy :—

Drupes globose. .. 10. *Sapindus*.Drupes oblong. .. 11. *Aphania*.

Fruit muricated or tubercled ; pericarp crustaceous :—

Sepals imbricate. .. 12. *Xerospermum*.Sepals subvalvate. .. 13. *Nephelium*.

1. CARDIOSPERMUM Linn.

Cardiospermum Halicacabum Linn. Vern. *Kapalphuta*, Ass. ; *Thaimodo-dukha*, Kach. ; *Sib-jhul*, *Nayaphatki*, Beng.

A thin wiry climbing herb with sulcate branches. *Leaves* alternate, bi-ternate, 2-3 in. long, deltoid in outline. *Leaflets* 3-1 in. long, lobed or coarsely dentate, acuminate, membranous, more or less pubescent. *Flowers* very small, white, polygamodioecious in few flowered umbellate cymes. *Peduncles* 3-5 in. long, very slender, the lowest pair of branches opposite and developed as spiral tendrils. *Sepals* 4, in unequal pairs, each with a scale at or above the base. *Ovary* 4-celled, with an ascending ovule in each cell. *Capsule* 3-celled, trigonously pyriform, inflated, loculicidal. *Seeds* about 1 in. diam., globose, arillate at the base, exalbuminous.

Common in drier uplands in the PLAINS, also in the NORTH CACHAR HILLS, e.g., Maibong, Dautuhaja, etc.

The seeds and roots possess valuable medicinal properties.

Fls. and Fr. 4-12.

{2. ÆSCULUS Linn.

Æsculus punduana Wall. Vern. *Ikuhia*, *Raman-bih*, Ass. ; *Sartok-asing*, Abor ; *Ramon-asing*, Miri ; *Phaklang-jan-arong*, Mik. ; *Phrado-buphang*, Kach. ; *Dingari*, *Khangkher* or *khangkhir khola*,

Mech ; Rimot, Bol-rimmu, Garo ; Dieng-chhang or Dieng-sang-kenrop, Dieng-dula or dola, Khasi ; Ngraurau, Naga.

A small or middle-sized deciduous tree with spreading branches and scaly buds ; bark greyish, warty outside, .25 in. thick ; inside whitish, speckled with numerous brown dots, exuding watery sap when cut. *Leaves* opposite, exstipulate, digitate ; common petiole 7-12 in. long, terete, glabrescent. *Leaflets* up to 7, gradually smaller from the terminal, 5-15 by 2-5 in., oblanceolate, acuminate, finely serrulate, subcoriaceous, glabrous ; main lateral nerves 20-25 on either half, almost transverse to the midrib at the base, slightly arched at the outer extremity, tertiary nerves slender, transverse to the lateral nerves, sub-parallel ; base acute ; petiolules .2-.7 in. long, flattened above. *Flowers* irregular, white, .5-.6 in. long (excluding the stamens) in large terminal thyrsoid panicles of penduncled cymes. *Panicles* up to 24 in. long, dun-pubescent when young ; pedicels gradually shorter upward. *Calyx* .2-.3 in. tubular, lobes 5, imbricate, rounded at the apex, dun-canescens outside. *Petals* 4, rarely 5, white, unequal, clawed, externally pubescent, often with a yellow spot at the base. *Stamens* slender, usually 7, free, much exserted. *Disk* unilateral. *Ovary* 3-celled, cells with 2 superposed ovules ; style elongated, slender. *Fruit* a brown leathery rugose, ovoid or obovoid, apiculate, loculicidal capsule, 2-3 in. long ; valves 2-3 in each cell. *Seed* 1 in each cell, 1-2 in. long, brown, smooth with a very large oval hilum ; cotyledons thick, not separable.

Common along streams and ravines in the hills and their vicinity throughout the Province, ascending to 4,500 ft.

Wood white, soft, close-grained, weighing about 36 lbs. per c. ft., capable of being turned into cups, plates and vases and of being chiselled into toys, etc.

Fls. 1-2. Fr. 4-7.

3. ALLOPHYLUS Linn.

Shrubs or small trees. *Leaves* alternate, 1-3-foliolate, exstipulate. *Flowers* small, generally white, polygamo-dioecious, irregular in simple or branched racemes ; pedicels short ; buds globose. *Sepals* 4, in opposite pairs, outer pair small, inner cucullate, widely imbricate. *Petals* 4, very small or obsolete, usually with a shaggy scale above the claw. *Disk* unilateral, usually with 4 glands opposite the petals. *Stamens* 8, inserted on the receptacle inside the disk. *Ovary* usually 2-lobed and 2-celled, reduced merely to a pistillode in the male flowers ; styles 2, stigmatic on the inner face ; ovule one in each cell. *Fruit* indehiscent with 1-2 subglobose lobes. *Seeds* erect, usually with a short aril at the base ; embryo curved ; cotyledons plicate.

Leaves 1-foliolate ; racemes more or
less branched.
Leaves 3-foliolate ; racemes simple.

..
..

1. *A. Zeylanicus*.
2. *A. Cobbe*.

1. *Allophylus zeylanicus* Linn.

A large shrub or small tree with terete glabrous branches and whitish bark; young shoots pubescent. *Leaves* 1-foliolate, 2-12 by 1-6 in., oblong, ovate or obovate, acuminate, usually toothed or repand, generally subcoriaceous, glabrous, often with a pair of short processes at the upper extremity of the petiole which is .5-2.5 in. long. *Racemes* usually long-peduncled, very variable in length, generally with a few branches at the base. *Flower-buds* globose, .04-12 in. diam. *Fruit* globose, red when ripe.

Two varieties occur in Assam:—

1. *assamica*; leaves quite entire, glabrous; racemes short.
2. *grandifolia*; leaves large, obovate, toothed or repand-denticulate, submembranous; racemes 2-4 in. long.

Doyang Reserve, SIBSAGAR DIVISION, Margherita, LAKHIMPUR, Abdul Haq! Ghuttermukh, CACHAR-Præzer! NAGA HILLS, Watt!
Fls. 4-5. Fr 9-10.

2. *Allophylus Cobbe* Bl. Vern. *Arhik-bouna*, Lushai; *Chi-cehirum*, Tipp.

A shrub up to 15 ft. in height with grey lenticellate bark. *Leaves* 3-foliolate; common petiole 2.5-7 in. long, finely channelled or margined. *Leaflets* very variable, 3-10 by 1.5 in., elliptic, obovate or lanceolate, lateral oblique, generally serrate, acuminate, membranous, dark-green and almost glabrous above, paler and glabrescent to pubescent beneath; lateral nerves 10-12 on either half, slender, arched; base cuneate; lateral petiolules 1.5 in., terminal 3-1 in. long. *Flowers* white, about 1 in. across when expanded, clustered on narrow, usually simple, axillary, puberulous or pubescent racemes, 3-9 in. long; pedicels very short, slender. *Petals* cuneate, shaggy above the claw. *Drupels* .25 in. diam., globose, orange red, when ripe.

An exceedingly variable and widely distributed species of the forms mentioned by Hiern in F. B. I., the following may be separated within our area:—

- I. Racemes simple; leaflets lanceolate.
 Leaflets obscurely serrate, subentire, nearly glabrous; bracts small. .. *glaber*.
 Leaflets sharply and sometimes coarsely serrate.
 Petioles, under surface of leaves and inflorescence pubescent to tomentose; bracts linear exceeding the buds. .. *Aporetica*.
- II. Racemes branched, solitary. .. *Rheedii*.
- III. Racemes simple, usually 2 together, petals not declinate. .. *distachys*.

These forms are however connected by intermediate links.

Not uncommon in the DHANSIRI VALLEY, Lumding etc., in NOWGONG, also on the Northern slopes of the KHASI HILLS.

The fruit is edible when ripe and the roots possess astringent properties.

Fls. & Fr. apparently throughout the year.

The following may also be mentioned:—

A. longipes Radlk. Pflanzenreich. Heft 98. P. 592. A small tree. *Leaves* 3-foliolate; common petiole 1.5-4 in. long; leaflets 4.5-9 by 1.2-3 in.; lateral, somewhat smaller with shorter petiolules, narrow lanceolate, remotely serrulate, membranous, glabrous. *Racemes* 8-11.75 in. long.

not much branched ; peduncle long. *Buds* about .08 in. across. *Sepals* glabrous. *Petals* broad, elliptic, scale deeply 2-fid, shaggy ; ovary thinly hairy. *Loles* of fruit 3.4 in. long.

GARO HILLS, Tura—Mrs. Parry.

A. subfalcatus Radlk. Records of Botanical Survey of India Vol III—3 (1907). A shrub? *Leaves* 3 foliolate ; common petiole 2.3.5 in. long. *Leaflets* 3.5-9.3 in., elongate, lanceolate, acuminate often falcate, base of the lateral ones often unequal, remotely serrate-dentate, chartaceous, glabrous. *Racemes* not much branched, 1.7-6 in. long ; buds small. *Sepals* glabrescent. *Petals* cuneate ; disc puberulous. *Ovary* pilose. *Lobes* of fruit .4 in. long.

ASSAM, KHASI HILLS.

4. DITTELASMA Hk. f.

Dittelasma Rarak Hook. f. Vern. *Am-selenga*, Ass. (Sib.).

A middle-sized or small tree scarcely exceeding 50 ft. in height in Assam with grey leathery plain bark ; young parts softly tomentose. *Leaves* alternate, pinnate, 1.1.5 ft. long ; rachis tomentose when young, angled and ribbed. *Leaflets* (in Assam) 8 to 12, sub-opposite or alternate, 4-8 by 1.2.5 in., falcately lanceolate or oblong, acuminate or cuspidate acute, quite entire, subcoriaceous, more or less pubescent when young, afterwards glabrescent or glabrous, pale beneath ; main lateral nerves 20-25 on either half with one or more intermediate ones between them, tertiary nerves reticulate ; base oblique, cuneate ; petiolules .15-.25 in. long. *Flowers* pale, polygamo-monœcious, bracteate, in large terminal or axillary rusty pubescent, panicles. *Sepals* 5, oblong, somewhat unequal ; both sepals and petals tomentose outside. *Petals* oblong, each with a large hairy scale at the base, parallel to and nearly as long as the blade. *Disk* semicircular, glabrous. *Stamens* 8, equal ; filaments hairy, inserted inside the disk and around the base of the ovary. *Ovary* globose, 3-lobed, 3-celled, with one ovule in each cell. *Fruit* of 3 cocci, but usually only one develops to maturity and attains about 1 in. in diam., indehiscent, with a fleshy saponaceous pericarp. *Seed* globose, exarillate, exalbuminous ; testa horny ; cotyledons unequal.

Not common in the NORTH CACHAR and KHASI HILLS up to 3,000 ft., also in UPPER ASSAM, especially in the SIBSAGAR DISTRICT.

The fruit has the same properties as that of the soap-nut (*Sapindus Mukorossi* and other allied species).

Fls. 6-7. Fr. 10-11.

5. ERIOGLOSSUM Bl.

Erioglossum rubiginosum Bl. Syn. *E. edule*. Bl. Vern. *Abigran*, Garo.

A small tree with dark-grey warty bark .25 in. thick, which exfoliates in large pieces exposing a dark-brown or black surface ; inside reddish-brown, fibrous ; young parts rusty or golden tomentose. *Leaves* imparipinnate, 9-15 in. long, common petiole terete, velvety-tomentose. *Leaflets* 5-15, generally opposite or

subopposite, 4-10 by 1-3·5 in., oblong or elliptic, lateral more or less oblique, acuminate, entire, chartaceous, rusty-tomentose on both surfaces but glabrescent above; lateral nerves about 10 on either side of the midrib, arched, tertiary nerves reticulate; base unequal-sided; petiolules 1-2 in. long. *Inflorescence* 6-11 in. long of cymose clusters, borne or lax, usually paniced racemes, rusty-tomentose throughout; bracts linear, woolly. *Flowers* fragrant, brownish-white, irregular. *Calyx* 5 partite, segments about 15 in. long, two outermost smaller than others, 5 concave, imbricate in bud. *Petals* 4, slightly exceeding the calyx-lobes, obovate-oblong, clawed, each with a 2-lobed bearded scale. *Disk* 1-sided, lobed. *Filaments* 8, one forked, hairy; anthers 9. *Ovary* stipitate, 3-lobed; style declinate. *Fruit* of 3 drupels, black when also ripe.

Plains evergreen forests in the ASSAM VALLEY, not at all common.
The ripe fruit is eaten.
Fls. 3-4. Fr. 7-8.

6. CUPANIA Linn.

Trees or large shrubs. *Leaves* alternate, generally paripinnate; leaflets entire. *Flowers* small, polygamo-dicæous. in axillary or subterminal bracteolate panicles. *Sepals* 5-4, or sometimes united at the base, concave, in two series. *Petals* 5-4 or wanting, sometimes with scales at the base. *Disk* annular, fleshy, glabrous. *Stamens* 7-10, inserted within the disk. *Ovary* generally obovoid, 2-4-celled, with one ovule in each cell. *Fruit* capsular, usually loculicidal. *Seeds* globose or oblong, generally arillate, exalbuminous.

Middlesized tree. Flowers greenish.

Petals with two scales each.

Small tree. Flowers whitish. Petals often 0, without scales. .. 1. *C. Pentapetala*.

.. 2. *C. sumatrana*.

1. *Cupania pentapetala* W & A. Vern. *Koipura*, Sylh.

A fairly large tree. *Leaves* up to 12 in. in length; rachis not winged. *Leaflets* 4-8, sub-opposite or alternate, 4-8 by 1-2·5 in., ovate or oblong, bluntly acuminate, coriaceous, glabrous, shining; lateral nerves faint, slightly arched; base obtuse; petiolule 12-25 in. long. *Flowers* 5-merous, dull yellowish green, pubescent, about 15 in. diam., in racemes arranged in dense panicles. *Calyx* 5-cleft, lobes sub-valvate. *Petals* small with two glabrous incurved scales at the base. *Stamens* 7-8, exserted; filaments pubescent. *Disk* pubescent. *Ovary* 3-celled, pubescent; style short. *Capsule* stipitate, 4 in. across, pyriform, not lobed; seeds arillate.

SYLHET, Roxburgh

2. *Cupania sumatrana* Miq. Syn. *Mischocarpus pentapetalus* Radlk.

A small tree up to 40 ft. in height with a narrow crown ; branchlets reddish. *Leaves* up to 2 ft. in length ; rachis red. *Leaflets* up to 10, alternate or subopposite, 3-10 by 1·5-3 in., ovate or ovate-oblong, slightly acuminate, glabrous, chartaceous ; lateral nerves very faint, often with axillary glands, petiolules 1·5-3 in. *Flowers* whitish, 1 in. across, in panicles 6-12 in. long. *Calyx* and *Stamens* as in the preceding species. *Petals* small or wanting, without scales. *Capsule* 6-8 in. long, pyriform, ribbed, apiculate on 3-gonous stipes, red when ripe.

SYLHET, Gomez !

7. HARPULLIA Roxb.

Harpullia cupanoides Roxb. Vern. *Jong-kitil-thing*, Kuki ; *Harpulli*, Beng. (Chitt.).

A deciduous tree up to 50 ft. in height with a straight trunk, bark greyish-brown outside, more or less thickly covered with black lenticels, green beneath the corky layers, inside greenish-white to light brown, granular, with strands of brownish fibrous tissue, 2-2·5 in. broad ; branches ascending ; young parts rusty-velvety, hairs both simple and stellate. *Leaves* 6-8 in. long ; paripinnate or imparipinnate with a rudimentary terminal leaflet ; common petiole terete, rusty-pubescent. *Leaflets* 8-12, generally alternate, rarely sub-opposite, 3-9 by 1-2·5 in., ovate, elliptic or elliptic-oblong, membranous or thinly coriaceous, entire, acute, glabrous above, glabrous or minutely puberulous and glaucous beneath, always more or less puberulous along the midrib and nerves beneath ; main lateral nerves 10-16 on either half, slender, slightly arched ; base subacute or oblique with the upper half rounded or sometimes cuneate ; petiolules 2-3 in. long, rusty-velvety. *Flowers* about 3 in. long, pale-yellow, polygamous, in spreading pubescent panicles, 4-9 in. long from axils of existing or fallen leaves or extra axillary ; bracts 3-1·5 in. long, spathulate, acuminate ; bracteoles linear or subulate, tomentose ; pedicels short. *Calyx* usually 5-partite ; rusty-tomentose, lobes 2-2·5 in. long. *Petals* 5, about 6 in. long, oblong-lanceolate, clawed. *Stamens* 5 ; filaments shorter than the petals ; anthers oblong. *Disk* very small, hairy. *Male flowers* with villous pistillode. *Ovary* 2-lobed, 2-celled, hairy ; ovules usually 2 in each cell, pendulous. *Capsule* 1 by 1·5-2 in., compressed, transversely oblong, apiculate, shortly stipitate, inflated, pendulous, pale-yellow to bright-orange pubescent towards the base and often along the suture between the lobes. *Seeds* usually 1, 5-6 in. long, horizontal, obliquely ovoid-oblong, with a thick funicle and orange aril covering the base (?), hilum basal, testa dark brown, almost black ; cotyledons green ; radicle lateral ; albumen 0.

NORTH CACHAR HILLS, Mupa Valley, Panimur, etc.

Wood white, soft, apparently not suitable for use as timber, weighing about 42 lbs. per c. ft. pores with white deposit inside.

Fls. 2-3. Fr. 5-6.

According to Roxburgh the aril covers the whole seed except the apex. In my specimens the aril forms a disk-like cup at the base only, but these may not have been sufficiently mature.

8. LEPISANTHES Bl.

Lepisanthes burmanica Kurz.

An evergreen tree up to 25 ft. in height with a straight palm-like trunk; young shoots tomentose; bark fairly smooth, greyish-brown and with white blotches outside, leathery, reddish-brown inside. *Leaves* paripinnate, 2-3 ft. long; common petiole slightly channelled, pubescent. *Leaflets* 8-12, opposite or subopposite, 8-12 by 2·2-3 in., sometimes up to 14 by 4 in., elliptic or oblong-lanceolate, entire, acuminate, obtuse at the base, chartaceous, glabrous and dark-green above, puberulous along the midrib and nerves beneath, pinkish-white while very young; lateral nerves about 15 on either half, arched, prominent beneath; tertiary nerves reticulate; petiolules about 15 in. long, stout, puberulous. *Panicles* terminal or axillary, 12 in. or more in length, shaggy-tomentose, bearing numerous spike-like cyme-bearing racemes. *Flowers* pale-yellow, about 2 in. long, subsessile, mostly cymosely fascicled. *Sepals* 4-5, imbricate, orbicular, silky outside, glabrous inside. *Petals* 4, obovate or spatulate with a densely hairy scale above the claw. *Stamens* 8; filaments short, glabrous; anthers broad. *Disk* annular. *Ovary* densely woolly, 3 celled; ovules solitary in each, style short. *Fruit* drupaceous, about 3 in. diam., seed solitary; exalbuminous; cotyledons unequal.

Tippum near Jaipur, LAKHIMPUR, also in the Guma Reserve, GOALPARA; —not very common.

Wood white with wavy horny concentric bands; pores scanty but large; weight 36 lbs. per c. ft.

Fls. 5-6.

L. Listeri King ms.ex Radlk in Records of Botanical Survey Vol. III, P. 344.

A shrub? *Branchlet* terete; young parts somewhat harshly tomentose. *Leaves* with 4 pairs of leaflets, rachis striate, pubescent, 13-17 in. long or probably longer; petiolar portion 6-9 in. long. *Leaflets* subopposite, 6·5-13·5 by 2·5-6 in., upper usually larger, obovate-oblong to oblanceolate, shortly acuminate, narrowly obtuse at the base, thin, glabrous or puberulous on the midrib and nerves above, rough with minute harsh hairs beneath, nerves prominent on the under surface; lateral nerves many; petiolules stout, 3·5 in. long. *Racemes* supra-axillary, usually 2 or 3 together, 2-3·7 in. (sometimes about 7 in. if Burkill's sheet 3469 from Janakmukh, N. E. Frontier is this species), somewhat harshly tomentose at least when young. *Flowers* not seen. *Sepals* 5, ferruginous-tomentose; pedicels in fruit up to 4 in. long, articulate at the base. *Drupe* ellipsoid, about 1·7 in. by 1·3 in., with 3 compressed loculi, at first tomentose, less hairy with age, pericarp fleshy.

N. E. FRONTIER—Burkill! Duffla Hills—Lister!

Fr. 1.

L. assamica Radlk. Records of Bot. Survey Vol. III, P. 343.

A shrub? *Innovations* brown tomentose. *Leaves* paripinnate, 4-6 foliolate, rachis 12-14 in. long; leaflets subopposite, lanceolate-oblong, subcoriaceous; lateral nerves many, spreading, glabrous. *Racemes* axillary, fascicled, 1-3 in. long, densely dark-brown, pubescent; pedicels short, about 1 in.; buds subglobose up to about 2 in. across. *Sepals* 5, densely pubescent outside,

sericeous within. *Petals* 5, broadly spathulate, scales bilobed, fimbriate; disk glabrous. *Stamens* 11-12; pistillode 3 locular, 3-grooved, villous. *Female* flowers and fruits not known.

SOUTH LUSHAI HILLS near Lungleh—Gage, 3000-4000 ft.
Flrs. 4.

9. SCHLEICHERA Willd.

Schleichera trijuga Willd.

A medium sized to large branchy, deciduous tree. *Bark* light or dark grey, exfoliating in irregular plates; blaze hard, pink; young parts rusty tomentose. *Leaves* alternate, paripinnate, rachis up to 6 in. long. *Leaflets* 4-8, opposite, terminal pair largest, then gradually smaller to the lowest pair, 2-9 by 1-3.5 in. oblong or elliptic, entire, rounded, subacute or shortly acuminate at the apex; base usually unequal, glabrescent, dark green and coriaceous when mature, crimson then fresh green and pubescent along the nerves when young, nerves prominent beneath. *Flowers* small, polygamous, in pedicellate clusters on slender interrupted racemes 3-6 in. long, simple or often branched in male flowers, crowded at the ends of branches and axillary, extra axillary or borne on abbreviated branches; pedicels slender. *Calyx* minute, 4-6 lobed, lobes blunt. *Petals* 0. *Disk* annular, wavy. *Stamens* 5-8, longer than the calyx. *Ovary* hairy outside, flask-shaped, narrowed to a rigid style, 3-celled; stigma lobed. *Fruit* indehiscent, 8-1 in. long, smooth, ovoid and short pointed with dry and crustaceous rind. *Seed* enclosed in fleshy aril, smooth, brown.

Collected by Mr. R. N. De in GARO HILLS.

This is the only record we have in the herbarium of this well known tree from ASSAM.

The best lac is reared on this tree. The seeds yield an oil which is used for burning. The fleshy aril of the seeds is edible. The wood is heavy and durable.

Leafless about Feb-March for a very short time.

Flrs. 3 with new leaves. Fr. 8-9.

Seedlings trifoliate.

10. SAPINDUS Plum.

Sapindus Mukorossi Gaertn. Vern. *Ritha*, Ass. & Beng.; *Phenil*, *Arishta*, Sans.; *Manichal*, *Haitaguti*, Miri; *Haithal-bang*, *Phuwathai*, Cach.; *Hinghi*, Kuki; *Dieng-spieng-rah*, Synt.; *Thi-dak-dak-arong*, Mik.

A small deciduous tree up to 40 ft. in height with a broad globose crown; bark dark-greenish-brown, fairly smooth, with many vertical lines of lenticels and fine fissures, 12 in. thick, inside greenish-white and very faintly speckled. *Leaves* 12-20 in. long, paripinnate; common petiole very narrowly bordered, glabrous. *Leaflets* 10-20, generally alternate, often subopposite or even opposite, 3.5-6 by 1-2 in., gradually smaller towards the apex of the rachis, lanceolate or oblong, entire, acuminate, coriaceous, glabrous, turning yellow before falling; main lateral nerves

12-25 on either half with one or two intermediate ones between, much arched, generally with a pit at the axil; base more or less oblique; petiolules 1-3 in. long. *Inflorescence* a compound terminal panicle, 12 in. or more in length with pubescent branches. *Flowers* about 1 in. across, polygamous. *Calyx-lobes* 4-5, somewhat unequal, ciliate. *Petals* 5, each with a woolly scale on either side above the claw. *Stamens* 8, inserted at the centre of the annular disk; filaments woolly; anthers versatile, exserted. *Ovary* 3-cornered, normally 3-celled, glabrous; style terminal; ovule solitary. *Fruit* a globose fleshy 1-seeded drupe, 7-1 in. across; pericarp and endocarp saponaceous, wrinkled and somewhat translucent when dry; seed 3-5 in. diam., globose, black, loose in dry fruit, testa crustaceous; albumen 0.

Cultivated in villages especially in the hills, and very often found as an escape in deciduous forests.

The wood weighs about 44 lbs. per c. ft., light-yellow, compact, close grained, but is not used as timber. The saponaceous covering of the fruit is a very good substitute for washing soap and is much used. The leaves are eaten by cattle.

Flrs. 5-6. Fr. 10-1.

11. APHANIA Bl.

Shrubs or small trees. *Leaves* alternate, paripinnate or unifoliate; leaflets entire. *Flowers* polygamous, small, in large terminal or axillary panicles or racemes. *Calyx* 4-6-lobed, usually cup-shaped; lobes imbricate, petaloid. *Petals* 4-6, small. *Disk* complete, slightly lobed. *Stamens* 5-8, rarely fewer, inserted within the disk. *Ovary* usually 2-celled; style bifid; ovules solitary. *Fruit* fleshy, smooth, deeply 2-lobed. *Seed* exarillate; cotyledons thick.

Leaves usually pinnate, leaflets distant.

.. 1. *A. rubra*.

Leaves unifoliate, generally crowded at the ends of branches.

.. 2. *A. Danura*.

1. *Aphania rubra* Radlk. Syn. *Sapindus attenuatus* Wall. Vern. *Tang-ting*, *Bon-gadhi*, Ass. (Lakh.); *Tiktiki*, Ass. (Sib.); *Maiki-Bandardina*, Ass. (Darr.); *Hekokeko*, Ass. (Kam.); *Lal-koipura*, Beng. (Sylh.); *Thai-khrok*, Mech; *Dieng-soh-jimmang*, Khasi; *Dodekhi-thong*, Garo.

Usually a shrub attaining 12 ft., sometimes with a subscandent habit, rarely a small tree up to 20 ft. in height, branches verrucose, often with minute vertical fissures. *Leaves* alternate, crowded at the ends of branches; leaflets 8-10, mostly subopposite, very variable in shape and size, generally 5-12 by 1.5-4.5 in., ovate, elliptic-oblong or ovate to oblong lanceolate, acuminate, entire, sub-coriaceous, glabrous; main lateral nerves 10-15 on either half, generally with a shorter intermediate one between, arched, tertiary nerves reticulate; base rounded or slightly cuneate, petiolules 3-5 in. long, swollen at the base. *Flowers* about 15 in. across, brick-red, glabrous, in large terminal or lateral, puberu-

lous or glabrate panicles. *Calyx* lobes 4-5, greenish outside, unequal, ciliolate. *Petals* 4-5, as long as the sepals, sometimes with scale at the base. *Stamens* 6-8; filaments 0 or very short. *Ovary* 2-lobed. *Fruit* about .7 in. long, 1-2-lobed, ellipsoidal, red while ripening, purple and soft when fully ripe.

Found throughout the Province chiefly in evergreen types of forests.

Wood moderately hard and tough and used as tool-handles. The ripe fruit is eaten.

Flowers 11-1. Fr. 3-4.

2. *Aphania Danura* Radlk. Syn. *Sapindus Danura* Voigt. Vern. *Danura*, *Ambriuj*, *Nunchha*, Beng.

An evergreen shrub or small tree. *Leaves* 1-foliolate, often so crowded at the ends of the branches as to appear verticillate, 4-12 by 1-5 in., obovate-elliptic, oblong or lanceolate, acute or very shortly acuminate, entire, coriaceous, glabrous and shining on both surfaces, gradually narrowed to a rounded or subcordate base; lateral nerves 12-16 on either side of the midrib with shorter intermediate ones; petiole .08-.2 in. long, stout. *Flowers* small, yellowish-pink at the tips, in terminal panicles up to 12 in. long. *Sepals* 5, orbicular, unequal. *Petals* 5, each with a woolly scale at the base. *Stamens* 6-8; filaments short; anthers obtuse. *Disk* crenulate, glabrous. *Ovary* glabrous, 2-3-lobed. *Fruit* of 1-3 drupels, shortly stipitate, ellipsoidal, .3-.5 in. long, turning orange-red to blackish in ripening.

SYLHET and CACHAR and possibly also GOALPARA.

Fls. 2-4. Fr. 5-6.

12. XEROSPERMUM Bl.

***Xerospermum Noronhianum* Bl.** Vern. *Bura*, Beng. (Cach.); *Buru-buphang*, Kach.; *Khoirao*, Naga; *Dieng-soh-moni-ar-shree*, Khasi; *Shanpi*, *Khuranchi*, Garo.

A middle-sized evergreen tree with a dense oval crown; young shoots puberulous. *Bark* dark-brown outside, uneven with warts, red with green streaks underneath the thin corky layer, reddish brown inside, fibrous, brittle. *Leaves* alternate, paripinnate, exstipulate; leaflets generally 4, rarely 2, more rarely 1, 3-6 by .8-1.5 in., elliptic to oblong lanceolate, acuminate, quite entire, coriaceous, glabrous, shining on both surfaces; lateral nerves 10-12 on either half, slender, arched; tertiary nerves closely reticulate; base cuneate; petiolules .15-.25 in. long. *Flowers* small, light yellow or greenish in sub-simple fascicled axillary racemes of varying lengths up to 4 in.; pedicels up to .1 in. long. *Sepals* 4, imbricate, in 2 series, outer smaller, ciliate. *Petals* 4, ciliate without basal scales. *Disk* annular, glabrous. *Stamens* generally 8, inserted within the disk. *Ovary* didymous, 2-celled; ovule solitary, ascending. *Fruit* yellow, usually 1-lobed; lobes about 1 by .8 in., ellipsoid, muricated with low pyramidal

tubercles ; seed exarillate ; testa pilose ; cotyledons large, superposed.

Evergreen forests of UPPER ASSAM and the SURMA VALLEY, also in the HILL DISTRICTS up to 3,000 ft.,—not common. The wood appears to be hard, tough and heavy but coarse-grained.

Fls. 4-5. Fr. 11-3.

13. NEPHELIUM Linn.

Nephelium Longana Camb. Vern. *Naga-lichi*, Ass. (Lakh.) ; *Tokra*, *Kath-lechi*, *Mirgach*, Ass. (Nowg.) ; *Tagong-asing*, Abor ; *Asri-phang*, *Asuri-baphang*, Kach. ; *Marli-arong*, *Mirchesu*, Mik. ; *Marli-thing*, Kuki ; *Dieng-loba*, Khasi ; *Samphal-bol*, Garo ; *Eye-ball tree*, Eng.

A middle-sized evergreen tree up to 50 ft. in height, buttressed at base. *Bark* dark-grey and rough outside, reddish-brown and fibrous inside with fine concentric bands of whitish tissue. *Leaves* alternate ; common petiole terete. *Leaflets* 4-10, opposite or sub-opposite, rarely alternate, 2-10 by '6-2'5 in., elliptic, ovate or oblong-lanceolate, acute or acuminate, entire, subcoriaceous, glabrous and shining above, glaucous and generally soft beneath, red when young ; lateral nerves 12-20 on either half, tertiary nerves reticulate ; base more or less oblique ; petiolules '2-3 in. long, margined. *Flowers* polygamous, pale-yellow or dull-white, somewhat dimorphic, mostly in cymose clusters on the branches of terminal pubescent panicles, 6-12 in. long ; pedicels stout, buds globose. *Calyx* 5-6-lobed, lobes imbricate in bud, velvety tomentose on both sides. *Petals* generally 5, as long as the calyx-lobes, spathulate, pubescent. *Disk* tomentose. *Stamens* 6-10 ; filaments pubescent, longer in the male than in the female or hermaphrodite flowers. *Ovary* 2-3-lobed. *Fruit* '6-8 in. diam., globose, tubercled, purplish-red when ripe ; aril complete, thin, subacid.

Fairly common in evergreen types of forests in UPPER ASSAM and in the HILL DISTRICTS, ascending to 3,500 ft. in GARO HILLS, cultivated in most parts of India.

Wood close-grained, moderately hard, of a reddish colour, weighing about 55 lbs. per c. ft. It is used for posts and agricultural implements. The aril of the fruit is eaten.

Fls. 4-5. Fr. 7-9.

Nephelium Lit-chi Camb. Vern. *Lesi*, *Lisi*, Ass. ; *Nichu*, Beng.—is very closely allied to the above species. It has been successfully cultivated in some parts of Assam, e.g., Sibsagar, Dibrugarh and Gauhati. *Calyx* nearly truncate. *Petals* 0. *Disk* glabrous. *Fruit* about 1 in. long, tubercled, ovoid, ripening in May-June. Wood harder and heavier than of *N. Longana*.

Dodonæa viscosa Jacq. A stiff evergreen resinous shrub. *Leaves* alternate, exstipulate, subsessile, 1'5-3 by '2-1 in., oblanceolate, coriaceous, shining above. *Flowers* polygamous, inconspicuous, yellowish green, '2 in. across in short terminal panicles. *Calyx* 5 lobed ; lobes about '1 in. long. *Petals* 0. *Stamens* 8 ; disk inconspicuous. *Ovary* 3-4 celled. *Fruit* a compressed capsule, '5 in. long, membranous, 2-4 winged and septicidally 2-4 valved.

Sometimes grown in gardens e.g. Shillong.

FAM. 46. SABIACEÆ.

Climbing or erect shrubs or trees. *Leaves* alternate, exstipulate, simple or imparipinnate. *Flowers* small, 1-2 sexual, generally panicled. *Calyx* 4-5 cleft; lobes imbricate. *Petals* 4-5, imbricate, sometimes unequal. *Stamens* 4-5, inserted at the base of and opposite to the petals, all or two only perfect. *Disk* small, annular. *Ovary* 2-3 celled, compressed; ovules 1-2 in each cell; styles 1-2, free or connate. Fruit a drupe or of 1-2 dry carpels; seeds with a broad hilum; albumen 0.

Climbers. Petals and stamens equal, the latter all fertile .. 1. *Sabia*.
 Trees or large erect shrubs. Petals and stamens unequal.
 Only two stamens fertile. ... 2. *Meliosma*.

1. SABIA Coleb.

Scandent shrubs. *Leaves* simple, quite entire. *Flowers* usually 2-sexual, solitary or in cymes or panicles, each supported by a pair of opposite bracts. *Calyx* of 4-5 equal lobes. *Petals* 4-5, equal, generally green or purplish, with translucent veins. *Stamens* 4-5, all fertile. *Disk* annular, 4-5 lobed. Carpels generally 2; styles 2, terminal in flower, more or less cohering; ovules 2 in each carpel. *Fruit* of 1 or two dry and gibbous carpels 1-seeded, each with the remains of the styles which become sub-basal in fruit; seed reniform.

- I. Cymes simple, 3-5-flowered. Flowers greenish purple. Stamens equal. .. 1. *S. purpurea*.
- II. Cymes dichotomous, 7-11 flowered. Flowers yellowish, Stamens unequal. .. 2. *S. parviflora*.
- III. Cymes many flowered :—
 - A. Leaves glaucous beneath; flowers greenish-white :—
 - Panicles from leaf axils or supra-axillary; cymes peduncled, corymbosely arranged. .. 3. *S. lanceolata*.
 - B. Leaves green beneath; flowers yellowish :—
 - Panicles racemiform, rachis and its branches glabrous. .. 4. *S. limoniacea*.
 - Panicles much branched, rachis and its branches pilose. .. 5. *S. paniculata*.

1. *Sabia purpurea* Hk. f. & Th. Vern. *Jermi-neirang-chhai*, *Dieng-jermei*, Khasi.

A small straggling and rather bushy climber; branchlets green or greenish-purple; bark yellow inside. *Leaves* generally

2-3 by '3-1 in., but about twice this size on flowerless branches, oblong or lanceolate, long acuminate, softly and thinly coriaceous, puberulous when very young, otherwise glabrous, somewhat pale but shining beneath; main lateral nerves 3-4 on either half, slender, straggling with three or four intermediate nerves between them, much anastomosing; base generally rounded; petiole '2-5 in. long. *Peduncles* axillary, shorter than the leaves, filiform, irregularly branched, 3-5 flowered; pedicels '5-6 in. long. *Sepals* about '06 in. long, ovate. *Petals* nearly '16 in. long, oblong-lanceolate, purplish-brown, 5-nerved, tips often reflexed. *Filaments* subulate. *Drupe*s generally solitary, '2-3 in. across., orbicular, compressed, rugose, blue when fully ripe, with the style on one side a little above the calyx.

Fairly common in the KHASI HILLS, 4-6000 ft.

Flrs. 3-4. Fr. 6-7.

2. *Sabia parviflora* Wall.

A climbing shrub somewhat more woody and more rigid than the foregoing species and in some respects intermediate between it and the next species; young parts thinly pubescent. *Leaves* 2-4 by '7-1'3 in., ovate-oblong or ovate-lanceolate, with wavy margins, acuminate, coriaceous, glabrous, somewhat pale beneath, midrib stout; lateral nerves about 10 on either half, almost horizontal, joined by two lines of arched intramarginal veins far within the margin; base rounded; petiole '2-4 in. long, slightly puberulous or glabrous. *Cymes* dichotomous, 7-11 flowered; peduncles 1-1'5 in.; pedicels about '2 in. long. *Flowers* minute. *Sepals* ciliate. *Petals* oblong, 5-nerved. *Filaments* ligulate, unequal. *Drupe*s 1-2 together, '2-4 in. across, compressed; stone sub-reniform, prominently pitted and ridged on the margin.

KHASI HILLS, 3250 ft., Baipani Forest; 4-5000 ft., Mann. Not common.

Flrs. 4-5 (?). Fr. 7-8.

3. *Sabia lanceolata* Colebr. Vern. *Miri*, *Mandri*, Garo; *Samtamch*, Khasi.

A climbing shrub; bark black, yellowish inside. *Leaves* 3-7 by 1-2 in., bifarious, oblong-lanceolate or oblong, caudate acuminate, acute or rounded at the base, subcoriaceous or membranous, shining above, glaucous beneath; main lateral nerves 8-12 on either half, generally almost horizontal, joined by an intermarginal nerve well within the margin; petiole '2-4 in. long. *Panicles* peduncled bearing corymbosely arranged, peduncled cymes; peduncles axillary or supra-axillary; 1'5-2 in. long, slender, glabrous; rachis of panicles puberulous or glabrate; pedicels about '15 in. long, slender. *Flowers* greenish-white, sweet-scented. *Sepals* broadly ovate. *Petals* '15 in. long, ovate-acuminate, imbricate in bud. *Filaments* shorter than the petals, broadly

winged. *Fruit* generally of compressed sub-pyriform ; drupels '6-7 in. long, blue when ripe.

Plains of the BRAHMAPUTRA VALLEY also the KHASI and GARO HILLS up to 6,000 ft. Fairly common.

The leaves are used by the Garos for fomenting in cases of swellings and pain on the ankle or wrist.

Flrs. 11-12. Fr. 3-4.

4. *Sabia limoniacea* Wall.

A large climber ; bark blackish smooth and shining, yellow inside. *Leaves* 3-8 by 1.25-3.25 in., oblong to ovate-lanceolate, elliptic or oblong, acute or acuminate, thickly coriaceous, dark-green above, somewhat pale and often pinkish underneath, turning yellow when old ; main lateral nerves 5-6 on either side of the midrib, much arched, tertiary nerves reticulate and very prominent beneath ; base rounded or subacute ; petiole '6-1 in. long, channelled. *Panicles* axillary or supra-axillary, 3-5 in. long, racemiform, reddish, quite glabrous, with persistent bud-scales at the base ; pedicels '1-1.2 in. *Flowers* '1-1.2 in. across., greenish-yellow. *Calyx* lobes orbicular or broadly ovate. *Petals* '1 in. long, ovate or obovate, 5-nerved. *Stamens* included. *Fruit* of one or two drupels, each about '5 in. across, much compressed, red when ripe.

Throughout the plains of both VALLEYS, also up to 3,000 ft. in the HILLS, generally in evergreen types of forest.

Flrs. 12-2. Fr. 2-4.

5. *Sabia paniculata* Edgew.

A large evergreen climber ; stem dark-grey. *Leaves* 3-8 by 1.5-3 in., oblong-lanceolate, acuminate, coriaceous, dark-green and shining above, pale beneath ; main lateral nerves 6-8 on either half, much arched, tertiary nerves strongly reticulate ; base generally rounded ; petioles '3-6 in. long, shallowly channelled. *Flowers* yellow, inodorous, '1.5-2 in. across, in large lateral often leaf-bearing panicles ; ramifications and pedicels slender, red, pilose. *Sepals* elliptic, densely hairy outside. *Petals* about '1 in. long, oblong, 3-5 nerved, glabrous. *Filaments* ligulate. *Fruit* usually of a solitary drupel, '3 in. across., orbicular, compressed.

Along the foot of the Himalayas in NORTH KAMRUP, generally affecting shady and swampy localities.

Flrs. 1-2. Fr. 5-6.

Sabia ? sp. A large woody climber. *Leaves* 5-8 by 2-3 in. elliptic-oblong or oblong, abruptly short acuminate, coriaceous, glabrous, lateral nerves 6-8, much arched and anastomosing within the margin ; petiole swollen at the top, '4-8 in. long. *Flowers* not seen. *Cymes* few flowered, not peduncled ; pedicels puberulous, stout, '2 in. long. *Drupe* usually solitary, about '4 in. long.

Sheet No. 3793. Materials incomplete for identification.

Charduar—DARRANG.

Fr. 4.

2. MELIOSMA Bl.

Trees or shrubs, usually with hairy extremities. *Leaves* simple, or imparipinnate. *Flowers* small in large terminal or lateral thyrsoid panicles. *Sepals* and *petals* 4-5, unequal. *Stamens* usually 5, two fertile and adnate to the smaller petals, the rest without anthers; anther cells of the fertile stamens globose, attached to a large flat connective. *Disk* 4-5 toothed, cup-shaped, membranous. *Ovary* sessile, usually 2-celled; ovules 2 in each cell; style 1, subulate. *Fruit* a drupe, obliquely globose; endocarp bony. *Seed* solitary; cotyledons folded.

I. Leaves simple:—

Mature leaves glabrous; fruit pyriform, nearly ½ in. long.

.. 1. *M. Mannii*.

Mature leaves more or less puberulous beneath; fruit globose, about ½ in. across.

.. 2. *M. simplicifolia*.

II. Leaves imparipinnate; leaflets more or less pubescent; fruit globose, not exceeding ½ in. in diam:—

A. Leaflets distantly serrate:—

Leaflets 7-13.

.. 3. *M. Wallicfii*.

Leaflets 13-25.

.. 4. *M. pinnata*.

B. Leaflets quite entire, 11-15.

.. 5. *M. Arnottiana*.

1. *Meliosma Mannii* Lace.

A small tree; branchlets and ramifications of inflorescence covered with oblong lenticels. *Leaves* 2½-5 in. long, oblong or oblanceolate, distantly serrate-toothed or entire, rounded or somewhat acute at the apex, coriaceous, glabrous, shining above; lateral nerves 8-10 on either half, oblique, slightly arched, with tufts of hair-like scales at the axils, tertiary nerves finely reticulate; base cuneate; petiole ¾ in. long, swollen at the base. *Inflorescence* terminal, 8-10 in. long and as broad, dense-flowered, puberulous, lower part leafy. *Flowers* white, about ½ in. across on pedicels ⅕-⅙ in. long. *Sepals* generally 4, unequal, minutely ciliate. *Petals* 5, the three outer orbicular, concave, about ⅛ in. long. *Fruit* a pyriform drupe, ¾ in. long, scarlet when fully ripe, 1-celled, 1-seeded; pericarp fleshy, smooth; endocarp rugose and with a median ridge; cotyledons fleshy, oily.

KHASI HILLS, very rare. Distribution:— UPPER BURMA.

Flrs. (?) Fr. 1-2.

2. *Meliosma simplicifolia* Roxb. Vern. *Thowthowa*, Ass.; (Sibs); *Larubandha*, Ass. (Lakh.); *Pichola*, Ass.; (Darr.); *Sankonaro*, Ass. (Darr.); *Hengunia*, Ass. (Nowg.); *Phoko*, *Dhapapatia*, Ass. (Kam.); *Gurban-asing*, Miri & Abor; *Nitak-asing*; Miri; *Phaglan-jan-arong*, Mik.; *Dieng-lyng-krong*, *Dieng-la-pia*, *Dieng-nong-krow*, Khasi; *Nah-pui*, *Thing-erkum*, Kuki; *Lai-doibru*,

(or Dibru?), Mech; *Borsiring*, *Thaukhu-khokhra*, *Babari-chi*, *Samnabat*, Garo; *Bon-khoklu*, Cach.; *Koaso*, Naga.

A small tree, almost evergreen; bark greenish-grey outside, pink inside with very fine reticulating veins of deeper red, turning to reddish tan-brown after exposure, '3-5 in. thick, fibrous; exuding a watery juice from cuts; branchlets pubescent or puberulous. *Leaves* 5-15 by 1.5-6 in., oblanceolate or obovate-oblong, shortly acuminate or rounded at the apex, entire or distantly serrate-toothed, chartaceous or subcoriaceous, glabrous above, puberulous or glabrescent beneath; main lateral nerves 14-22 on either half, oblique but nearly straight, joining at the extremities to form a more or less continuous scalloped intermarginal vein; base very acutely cuneate; petiole 1-1.5 in. long, margined, swollen at the base, pubescent or glabrate. *Panicles* as long as or sometimes longer than the leaves, terminal with lower branches often from the axils of the upper leaves, pubescent. *Flowers* white, turning to pale-yellow, sessile or subsessile, scarcely .1 in. across., buds globose. *Sepals* ciliate. *Petals* 3, outer large, orbicular, 2 inner scale-like, bifid. *Drupe* about .2 in. across., globose; endocarp keeled and reticulate, rugose.

Common throughout the province, ascending to 3,000 ft. in the Hills.

Wood light reddish brown, moderately hard, pores evenly distributed, medullary rays numerous, moderately broad, weight about 33 lbs per c. ft.

Flrs. 1-5. Fr. 3-6.

3. *Meliosma Wallichii* Planch. Vern. *Dieng-sngit*, Khasi; *Dieng-chidit*, *Dieng-sniat*, *Dieng-la-myrsiang*, Syat.

A middle-sized tree up to 60 ft. in height and nearly 5 ft. in girth; branchlets rusty puberulous; older branches dotted with raised lenticels; bark dark-grey or greyish-brown, often with horizontal wrinkles, fibrous, inside white, on large trees in alternate broad radial bands of white and pink turning to tan-brown on exposer. *Leaves* imparipinnate, about a foot long, rachis terete, rusty-tomentose. *Leaflets* 5-13, opposite or subopposite, 3-7 by 1-2 in., ovate, obovate-oblong or oblong, acuminate, distantly cuspidate-serrate or on very old trees entire, subcoriaceous, glabrous and often with a grey metallic lustre above, rusty-tomentose beneath; lateral nerves 8-12 on either half, slanting and much arched; base rounded, more or less oblique; petiolules .2-.7 in. long. *Panicles* terminal, much branched, rusty-tomentose. *Flowers* very small, shortly pedicelled. *Sepals* orbicular-ovate. *Petals* sub-valvate. *Drupe* globose, about .2 in. across., reddish when ripe.

KHASI & JAINTIA HILLS 2500-6000 ft.

Wood very light, soft, spongy, light brown, medullary rays broad with finer ones in between, pores large, handsome on radial section with conspicuous silver grain liable to crack.

Flrs. rainy season. Fr. cold season.

4. *Meliosma pinnata* Roxb. Vern. *Hengnua* or *Hengunia*, *Banpasola*, *Mamoi*, Ass., *Dermi-asing*, *Miri*; *Nammu-Changne*, Duff.; *Toiram*, Kuki; *Dieng-krot*, *Dieng-soh-naior*, Khasi; *Bolnichik*, *Bolandime*, *Gapenda*, Garo.

Usually a small tree up to 35 ft. in height but occasionally grows up to 50 ft. *Bark* grey or brownish outside, dark-green underneath the cuticle, inside red, oxidising to brown after exposure. *Leaves* imparipinnate, 9-18 in. long; rachis terete, more or less puberulous. *Leaflets* 11-25, opposite or subopposite, 3-8 by 7-15 in., oblong-lanceolate, long-acuminate, usually distantly cuspidate-serrate, subcoriaceous, glabrous above, more or less pubescent beneath, especially along the reddish midrib and nerves, brownish-red when young; lateral nerves about 15 on either half, much arched, tertiary nerves closely reticulate; base acute or cuneate; petiolule 1-2 in. long, pubescent. *Panicles* terminal, 1 ft. or more in length with spreading branches. *Flowers* white, minute, sessile or shortly pedicelled; *Sepals* broadly or suborbicular, ovate, ciliate. *Petals* glabrous. *Drupe* globose, about 2 in. across.

Common throughout the PLAINS DISTRICTS of both VALLEYS and up to 3000 ft. in the HILLS.

The wood is light, porous and brittle, and of no timber value. The young leaves are eaten by the Miris cooked with fish.

Flrs. 4-6. Fr. 8-9.

5. *Meliosma Arnottiana* Wight?

A tree up to 40 ft. in height; branchlets rusty velvety tomentose. *Leaves* 6-10 in. long; common petiole and petiolules rusty pubescent. *Leaflets* 11-15, opposite or subopposite, 2-4 by 7-15 in., ovate to oblong lanceolate, caudate-acuminate, quite entire, chartaceous, glabrous above, rusty pubescent beneath; lateral nerves 8-10 on either half, oblique, slightly arched with a tuft of bristles at the axils; tertiary nerves closely reticulate; base rounded or subacute; petiolules 2-5 in. long. *Panicles* terminal, about a foot long, much-branched, ramifications rusty pubescent. *Flowers* minute, sessile or very shortly pedicelled. *Sepals* ovate, puberulous, ciliolate. *Petals* subvalvate. *Drupe* globose, about 15 in. across.

Barapani in the KHASI HILLS,—rare.

Flowers in our specimens are much smaller than in the type.

Flrs. 5-6. Fr. 7-8.

FAM. 47. ANACARDIACEÆ.

Trees or erect shrubs, the latter very rarely scandent, generally with a acrid milky or resinous juice. *Leaves* alternate (in all the species described here), simple, trifoliolate or imparipinnate, exstipulate. *Inflorescence* generally a terminal panicle. *Flowers* small, mostly regular, unisexual and polygamous or bisexual. *Calyx* 3-5-partite. *Petals* free, as many as the calyx-divisions and alternating with them, imbricate or valvate in bud, sometimes accrescent, rarely 0. *Disk* cup-shaped or annular. *Stamens* usually as many as the petals, rarely twice as many, inserted under or on the disk, sometimes not all fertile. *Ovary* usually superior and 1-celled; styles 1-4; ovule solitary in each cell, pendulous. *Fruit* a drupe; seed exalbuminous; cotyledons plano-convex.

- | | |
|--|---|
| <p>I. Stones 1-celled, 1-seeded, more or less compressed :—</p> <p style="margin-left: 20px;">A. Pericarp dry. Leaves 3-foliolate* or pinnate. Trees or erect shrubs. ..</p> <p style="margin-left: 20px;">B. Pericarp more or less fleshy :—</p> <p style="margin-left: 40px;">1. Leaves simple. Trees :—</p> <p style="margin-left: 60px;">a. Receptacles of fruit enlarged and fleshy. ...</p> <p style="margin-left: 60px;">b. Receptacles of fruit not enlarged :—</p> <p style="margin-left: 80px;">i. Stamens 4-5, usually only one, fertile. Ovary superior. ..</p> <p style="margin-left: 80px;">ii. Stamens 4-5, all fertile. Ovary inferior :—</p> <p style="margin-left: 100px;">Leaves entire; petiole spurred. ..</p> <p style="margin-left: 100px;">Leaves undulate; petiole not spurred. ..</p> <p style="margin-left: 40px;">2. Leaves imparipinnate :—</p> <p style="margin-left: 60px;">Trees. Stamens 8-10. ..</p> <p style="margin-left: 60px;">Climbers. Stamens 10. ..</p> | <p>1. <i>Rhus</i>.</p> <p>2. <i>Semecarpus</i>.</p> <p>3. <i>Mangifera</i>.</p> <p>4. <i>Holigarna</i>.</p> <p>5. <i>Drimycarpus</i>.</p> <p>6. <i>Lannea</i>.
(<i>Odina</i>).</p> <p>7. <i>Tapiria</i>.</p> <p>8. <i>Spondias</i>.</p> |
| <p>II. Stone 1-5 celled, not compressed, pericarp fleshy, Leaves imparipinnate. ..</p> | |

1. RHUS Linn.

Trees or shrubs with resinous or acrid juice. *Leaves* 3-foliolate or pinnate, rarely simple. *Flowers* small, polygamous, paniced. *Calyx-limbs* 4-6; petals 4-6, imbricate. *Disk* fleshy, annular. *Stamens* 4-10, inserted at the base of the disk, often lobed. *Ovary* sessile, 1-celled; styles 3. *Drupe* dry, with a pendulous seed.

* Assam species.

I. Leaflets pubescent or tomentose beneath :—

Petiole winged, densely pubescent.

Leaflets 4-6 pairs. ..

1. *R. semialata*.

Petiole not winged, slightly

pubescent. Leaflets 5-12 pairs. ..

2. *R. khasiana*.

Petiole not winged, glabrous or

nearly so. Flowers pedicelled. ..

3. *R. insignis*.

II. Leaflets glabrous beneath ;—

Panicles slender, glabrous or

nearly so. Flowers pedicelled. ..

4. *R. succedanea*.

Panicles stout, pubescent. ..

5. *R. Griffithii*

1. **Rhus semialata** Murr. Vern. *Naga-tenga*, Ass.; *Soh-ma*, *Dieng-soh-ma*, *Dieng-soh-sma*, Khasi; *Dieng-sa-ma*, Synt.; *Khetma*, *Khitma*, Garo; *Gimbao*, Kach.; *Khokma-thing*, Kuki; *Bhakhimlo*, Nep.

A small deciduous tree somewhat gregarious in habit, young parts and inflorescence covered with dark-grey pubescence; bark ashy-grey, warty, dull greenish-white inside. *Leaves* imparipinnate, over a foot long; common petiole usually winged between upper leaflets. *Leaflets* 4-6 pairs, opposite, lateral sessile, 2-4 by 1-2 in., elliptic ovate or oblong-lanceolate, acuminate, deeply crenate or dentate, membranous, pubescent along the midrib, otherwise glabrous above, densely grey-tomentose beneath; main lateral nerves 10-15 on either half, parallel, almost transverse; base rounded, oblique. *Panicles* terminal, 6-8 in. long, conical, dense-flowered. *Flowers* 1 in. across, whitish or pale-green; pedicels minute. *Sepals* small, ovate, pubescent. *Petals* oblong, ciliate, much exceeding the sepals. *Drupe* 15-2 in. across, sub-globose, compressed, pink when mature.

Common in the KHASI HILLS above 2,500 ft., also found along the foot of the Himalayas e.g., Dulong-mukh, Khalingduar, etc.

The ripe fruit has a sharp acid taste and is much eaten by the Nepalese. It is also used as a substitute for rennet in preparing curds. It is said to be a remedy for colic.

Fls. 5-9. Fr. 9-4.

2. **Rhus khasiana** Hk. f.

A middle-sized tree up to 45 ft. in height; bark 7 in. thick, greyish-brown and rough outside, split into oblong plates, red below the outer dead layers, inside finely fibrous, light red, mottled with white streaks. *Leaves* pinnate, 12-18 in. long; common petiole slender, minutely grey-puberulous, glabrescent. *Leaflets* 5-12 pairs, often alternate, 3-5 by 6-17 in., lanceolate, sharply serrate or sub-entire, acuminate, membranous, glaucous and hairy along the midrib and nerves beneath; lateral nerves about 15 on either side of the midrib, very slender, slightly arched; base obliquely cuneate; petiolules about 2 in. long. *Panicles* terminal, rather lax. *Drupe* 3 in. across, orbicular-ovate, compressed, pedicelled; epicarp papery; endocarp fibrous.

KHASI HILLS. not common.

3. *Rhus insignis* Hk. f.

A handsome tree up to 30 ft. in height; branchlets stout, with rusty-villous tips. *Leaves* 12-20 in. long; common petiole terete but slightly angled towards the base, glabrous, speckled with lenticels. *Leaflets* 7-11, 3-9 by 1·7-3·5 in., ovate, oblong or lanceolate, abruptly or tapering acuminate, entire, sub-coriaceous, glabrous and shining above, softly rusty-tomentose beneath; lateral nerves 20-30 on either half, parallel, slightly arched, tertiary nerves strong; base unequally rounded, sometimes cordate; petiolules 15-25 in. long, glabrous. *Panicles* axillary, shorter than the leaves, lax, long-peduncled, rachis and ramifications lenticelled, glabrous. *Flowers* 1 in. across. *Petals* with a stout midrib. *Drupe* globose, 3 in. across; epicarp thin, dry; endocarp waxy; stone crustaceous.

KHASI HILLS, not common,—Nartiang, Jowai Sub-Division—Distribution—Sikkim.

Fls. 5-6. Fr. 7-10.

4. *Rhus succedanea* Linn. Vern. *Dieng-kean* or *-kain*, *Ka-kain*, Khasi; *Dieng-suit*, Synt. (Nartiang); *Thing-hran*, Kuki; *Bol-micheng*, *Bol-khat-thi*, Garo.

A middle-sized deciduous tree up to 50 ft. in height. *Bark* 1-15 in. thick, dark-grey and rough outside, split with vertical reticulate fissures and exfoliating in irregular flakes, white to very light brown inside, faintly mottled with strands of darker brown fibres,—on young parts plain and with horizontal lines or lenticels. *Branchlets* usually glabrous. *Leaves* imparipinnate, crowded at the ends of branches; common petiole swollen at the base, terete, glabrous. *Leaflets* 3-6 pairs, opposite, 2-6 by 7-2 in., ovate to lanceolate or oblong, long-acuminate, entire, thinly coriaceous, usually quite glabrous, pinkish brown when very young, turning red before falling; main lateral nerves 12-25 on either half, straight, almost transverse, often alternating with shorter intermediate ones; base acute or rounded, more or less oblique; petiolules 2-4 in. long, slender or fairly stout. *Panicles* axillary, 5-10 in. long, with slender and drooping branches, usually glabrous. *Flowers* greenish yellow, scarcely 1 in. in diam. *Sepals* ovate, obtuse. *Petals* much larger, oblong. *Disk* 5-lobed. *Drupe* 25-3 in. in diam., orbicular-compressed, rugose, glabrous, shining yellow or tan-brown; epicarp thin, bursting irregularly; mesocarp fibrous; stone compressed, hard, surrounded with a thick coating of wax.

Fairly common throughout the province, specially in the hills and their neighbourhood.

Wood greyish white, twining brown with age, heartwood small, yellow. In this province the wood is heavier (44·6 lbs. per c. ft), harder and tougher than given in Gamble's Timber Manual in respect of W. Himalayan specimens and seems to be suitable at least for agricultural implements. The wax of the

seeds is made into candles in Japan where the tree is also tapped for the famous lacquer varnish. The juice is corrosive.

Fls. 3-4. Fr. 1-5.

5. *Rhus Griffithii* Hk. f. Vern. Darmi-asing, Miri, also the names usually given to the foregoing species.

A smaller tree with a more open crown than *R. Succedanea*. *Bark* 25 in. thick, greyish-brown, lenticelled, otherwise plain, inside light-red, mottled with specks of deeper red, exuding a brown gum from cuts. *Leaves* imparipinnate, crowded at the ends of branches, 1-2 ft. long, quite glabrous; common petiole terete red. *Leaflets* 4-10 by 1-3.5 in., oblong, ovate or elliptic-lanceolate, acuminate, often abruptly, quite entire, coriaceous, more or less shining when mature; midrib red; lateral nerves 16-20 on either half, strong, parallel; base cuneate; petiolules stout. *Panicles* axillary, 5-6 in. long, branches pubescent, glabrate in fruit. *Flowers* 1 in. in diam., sessile or shortly pedicelled. *Sepals* ovate, pubescent. *Petals* linear-oblong. *Stamens* exserted. *Disk* lobed. *Drupe* about 25 in. across, orbicular or obliquely ovate, compressed; epicarp thin; stone surrounded with wax.

Fairly common in UPPER ASSAM and the HILLS.

The wood is of the same quality as of the preceding species. The young leaves are used as a vegetable by Miris and Abors.

Fls. 3-5. Fr. 7-10.

2. SEMECARPUS Linn. f.

Tree generally with acrid juice. *Leaves* alternate, simple, entire, coriaceous. *Flowers* polygamous or dioecious, generally in terminal panicles. *Calyx* 5-6-fid, segments deciduous. *Petals* 5-6, imbricate, usually much exceeding the sepals. *Disk* broad, annular. *Stamens* 5-6, inserted outside and below the disk, imperfect in the female flowers. *Ovary* 1-celled; styles 3. *Drupe* fleshy, oblong, more or less obliquely seated on a fleshy receptacle formed of the accrescent calyx-tube and the disk; pericarp filled with an acrid juice. *Seed* pendulous; testa coriaceous; cotyledons plano-convex; radicle superior.

Leaves pubescent beneath. Flowers 2-3 in. across; drupe obliquely oblong. ..

.. 1. *S. Anacardium*.

Leaves glabrous beneath. Flowers scarcely 1 in. across; drupe transversely oblong. ..

.. 2. *S. Prainii*.

1. *Semecarpus Anacardium* Linn. f. Vern. Bhela, Bhala, Beng. & Ass.; Bar-bhola, Ass. (Nowg.); Bhaola, Bhala, Bhelawa, Mech; Bol-agal, Bareri, Babari, Garo, Barla-arong. Mik.; Dieng-soh-bhala. Khasi; Pursho-bhola, Nep. Bhallataka, arushkara, Sans. The marking nut tree.

A moderate-sized deciduous tree; young parts and inflorescence pale velvety tomentose. *Bark* dark-brown to blackish-grey

outside, rough, split vertically, light-red inside, .3-.5 in. thick, exuding an acrid milky juice. *Leaves* alternate, simple, crowded at the extremities of branches, 8-24 by 4-14 in., obovate or elliptic oblong, sometimes pandurate, generally rounded at the tip, sometimes subacute, entire, thinly coriaceous, harsh with short scattered bristles, but glabrate with age, and dark green above, brownish-grey and tomentose beneath, specially along the nerves; midrib very stout; lateral nerves 16-24 on either half, prominent beneath, straight or slightly arched; base sub-acute or rounded, sometimes abruptly cordate; petiole 1-2 in. long, very stout, flattened above. *Panicles* terminal, lower branches often from upper leaf axils. *Flowers* .2-.3 in. across, sessile, in fascicles on the branches of the panicles; bracts lanceolate or subulate. *Calyx* obconic, 5-cleft, densely buff-velvety outside. *Petals* greenish-yellow, about .15 in. long or lanceolate, pubescent outside, glabrous within. *Disk* shaggy. *Filaments* subulate. *Styles* densely hairy. *Drupe* 1 in. long, somewhat obliquely oblong-ovoid, usually of the shape of a miniature mango, compressed, shining, black when ripe, seated on an orange coloured, fleshy receptacle formed of the disk, the base of the calyx and the extremity of the stalk.

Fairly common in deciduous forests in the BRAHMAPUTRA VALLEY and up to 2,000 ft. in the HILLS.

Wood soft and light, not used as timber. The cup of the ripe fruit is eaten raw, dried or roasted. The pericarp of the fruit contains an acrid juice which is used as marking ink, and in medicine.

Fls. 7-9 with new leaves. Fr. 12-3.

Somewhat rare in UPPER ASSAM and the SURMA VALLEY.

2. *Semecarpus Prainii* King Journ. Ass. Soc. Beng. 65 (1897), 511. Syn. *S. heterophyllus* Hk. f.

A large tree with rough brown bark and glabrous branchlets. *Leaves* 5-12 by 1.5-4 in., oblanceolate, abruptly obtusely acuminate, quite entire, coriaceous, dark-green and shining above, buff-grey and rather strongly reticulate beneath, quite glabrous on both surfaces; lateral nerves 15-20 on either half, abruptly arched near the margin, otherwise straight, tertiary nerves transverse to the secondary nerves; base very gradually narrowed to the petiole; petiole .7-1.5 in., slightly swollen at the base and depressed above. *Panicles* terminal, exceeding the leaves, branched down to the base with thinly pubescent branches. *Flowers* dioecious; bracts subulate. *Males* about .1 in. across, sessile in clusters of 3-8; buds globose; calyx pubescent, segments ovate or ovate-oblong, ciliolate. *Petals* elliptic to suborbicular, glabrous. *Female* flowers not seen. *Drupe* .5 in. long, broader than long; receptacle .3 in. long, obconic.

Very rare. Patharia Reserve, SYLHET (B. C. Sen Gupta) Dist. Java, Sumatra.

Fls. 3-4.

3. MANGIFERA Linn.

Evergreen trees, all parts more or less aromatic. *Leaves* alternate, simple, petiolate, coriaceous. *Flowers* small, polygamous in terminal panicles; bracts deciduous. *Calyx-segments* 4-5, imbricate, deciduous. *Petals* 4-5, imbricate with thickened longitudinal nerves. *Stamens* 4-5, inserted between the lobes of the fleshy disk, usually one only perfect and much larger than the others. *Ovary* sessile, 1-celled, oblique; style lateral, simple; ovule 1, pendulous from a basal funicle. *Drupe* large, fleshy; stone fibrous, more or less compressed; cotyledons fleshy, plano-convex, often unequal.

Leaves oblong-lanceolate, thickly coriaceous, lateral nerves nearly transverse:—

- | | | |
|--|----|---------------------------|
| Panicles pubescent. Flowers yellowish, sessile. Drupe blunt. | .. | 1. <i>M. indica</i> . |
| Panicles glabrous. Flowers white on fairly long pedicels. Drupe long acuminate. | .. | 2. <i>M. sylvatica</i> . |
| Leaves obovate, thinly coriaceous, lateral nerves very oblique. Flowers pedicelled. Drupe blunt. | .. | 3. <i>M. andamanica</i> . |

1. *Mangifera indica* Linn. Vern. *Am*, *Ass.* & *Beng.*; *Keidi-asing*, *Miri*; *Thekachu*, *Garó*; *Tharbi-arong*, *Mik.*; *Dieng-soh-pien*, *Dieng-thlai-nar*, *Khasi*; *Thaiguja-baphang*, *Kach.*; *Tagung-changne*, *Duff.*; *haidai*, *Tipp.*; *Amra*, *rasala*, *madhuduta*, *Sans.* The mango tree.

A large evergreen tree with rough thick dry-grey fibrous bark. *Leaves* crowded at the ends of branches 4·5-12 by 1·5-4 in., oblong or obovate-lanceolate, bluntly acuminate, entire but often with wavy margins, coriaceous, glabrous, mature, dark glossy green, pinkish when very young, turning yellow before falling; main lateral nerves strong, about 20 on either half, often with a few intermediate ones, arched, vanishing at the margins; base acute; petiole 1-2·5 in. long, swollen at the base. *Panicles* about 12 in. long, conical in outline, pubescent throughout; bracts elliptic, concave, deciduous. *Flowers* about .15 in. across, greenish-yellow, scented, male and bi-sexual on the same panicle. *Calyx* 4-5-partite; segments imbricate, ovate, concave, pubescent outside, deciduous. *Petals* 4-5, imbricate, much longer than the calyx-segments, ovate, pale-yellow with 3-5 longitudinal ridges. *Disk* fleshy. *Stamens* 4-5, inserted on the disk, only one perfect and much larger than the rest; filaments of fertile stamens subulate, others filiform. *Ovary* sessile, obliquely seated, ovoid, glabrous; ovule solitary; style sub-lateral, declining towards the fertile stamen. *Drupe* 2-4-up to 8 in. or more in cultivated forms—long, ovoid or globose, laterally compressed with a 'nose' on the ventral side near the tip indicating the position of the style, fleshy, generally yellow when ripe; mesocarp more or less stringy, aromatic, sharply acid to sweet when ripe; stone compressed, longitudinally furrowed, fibrous.

Cultivated throughout the province, also undoubtedly indigenous in the evergreen tracts of both valleys.

The wood is grey light and coarse-grained but does not warp or split much. It is therefore found fit for planks and packing cases. Weight about 40 lbs, per c. ft. The ripe fruit so much prized in other provinces, is however of little value in Assam owing to attacks of insects of various kinds.

Fls. 2-3. Fr. 5-7.

2. *Mangifera sylvatica* Roxb. Vern. *Bon-am*, Ass.; *Lakshmi-am*, Sylh. & Cach.; *Haibamin*, Tipp.; *Chuchi-am*, Nep.

A lofty evergreen tree with a dense globose crown. *Bark* brownish-grey; inside greenish yellow, the inner layers exuding a white gum. *Leaves* scarcely distinguishable from those of the mango tree, excepting that they are as a rule proportionately narrower and longer-petioled; main lateral nerves up to 25 on either half. *Panicles* much larger and with ascending slender glabrous ramifications. *Flowers* pinkish-white, on glabrous pedicels. *Calyx* 5-lobed, very small. *Petals* 5, oblong, twistedly imbricate. *Disk* slightly grooved, villous. *Stamen* solitary, inserted in the cavity of the disk. *Ovary* obliquely oval; style subulate. *Drupe* 3-4 in. long, ovate, obliquely tapering acuminate so as to be often hooked, very slightly compressed; stone less firm, less fibrous and less furrowed than of the mango; embryo ascending, radicle turned upward along the edges of the cotyledons.

Sporadic in the evergreen forests of UPPER ASSAM and the SURMA VALLEY.

The unripe fruit is more pleasantly aromatic than the mango and is very suitable to be made into tarts, pickles and jellies but the ripe fruit is very inferior. The timber is of the same quality as that of the mango tree, but has been found unsuitable for tea-boxes.

Fls. 9-10. Fr. 1-3.

3. *Mangifera andamanica* King in Journ. As. Soc. Beng. 65 (1897), 470.

Apparently only a small or middle-sized tree. *Bark* dark-brown, not so rough as of the other two species. *Leaves* 3-9 by 1-3.5 in., obovate, obtuse or bluntly acuminate, entire, thinly coriaceous, quite glabrous, concolor and shining on both surfaces; lateral nerves 10-12 on either half, not so strong as in the other two species, very oblique, somewhat straggling, tertiary nerves conspicuously reticulate. *Panicles* shortly peduncled. *Flowers* tetramerous, pedicelled. *Drupe* 1.5-2.5 by 1-1.5 in., oval blunt, compressed; pulp thin; stone large, rugose, finely tomentose.

Extremely rare, only once found by the writer at the foot of the Mikir hills near Barpathar, SIBSAGAR.

Fls. 9-10. Fr. 1-2.

4. HOLIGARNA Lam.

Holigarna longifolia Roxb. Vern. *Jhawa*, Sylh.; *Phol-hoi* or *Pholoi-kung*, Tipp.; *Hlang-phalaru*, Kuki; *Bonsu-buphang*, Kach.; *Kherai*, Manip.; *Ng-gai*, Naga; *Katebel*, Lush.

A lofty tree up to 100 ft. in height, with spreading branches, widely buttressed at the base; buds densely silky pilose. *Bark* grey outside, white or light red inside, exuding a caustic milky juice which turns black after exposure. *Leaves* densely crowded at the ends of the branchlets, 12-24 by 3-5.5 in., cuneiform-oblong, thin, coriaceous, abruptly acuminate, usually entire, glabrous, glaucous beneath; midrib stout; lateral nerves about 25 on either half, straight but suddenly up-turned at the extremity, sometimes ending in few coarse teeth; petiole .2-.3 in. long, usually with 2-4 incurved spurs .5-1 in. long. *Flowers* small, bracteate, polygamo-dioecious, 5-merous, dull-white, rusty tomentose, in axillary panicles 7-15 in. long with spreading branches; bracts linear; pedicels very short, elongating in fruit. *Calyx* rather sharply pentagonous, rusty tomentose, lobes minute. *Petals* 5, almost free, spreading, oblong, hairy. *Filaments* 5, shorter than the petals, much shorter in the female flowers, on the edge of the disk. *Disk* lining the calyx-tube in male flowers. *Ovary* inferior, compressed, hairy; styles 3, recurved; ovule solitary, pendulous. *Drupe* enclosed by the calyx-tube, about 1 in. long, ovate-oblong, slightly compressed; mesocarp with large cells filled with an acrid juice; cotyledons equal.

Fairly common in the evergreen forests of CACHAR and south-eastern part of SYLHET.

Wood light-grey, soft, very light, weighing about 25 lbs. per c. ft.

The acrid juice is used as a Varnish.

Fls. 12-1. Fr. 5-6.

Var. *Helfri* Hk. f. (sp). Young shoots pubescent. *Drupe* exposed at the top. Our form appears to be intermediate between *H. longifolia* Roxb and *H. Helfri* Hk. f. I am inclined to regard this as a variety of *H. longifolia*.
Katakhall reserve, CACHAR.

5. DRIMYCARPUS Hk. f.

Drimycarpus racemosus Hk. f. Vern. *Amsia*, Ass. (Lakh.); *Am-selenga*, Ass. (Darr.); *Dieng-borrah*, *Dieng-kain*, Khasi (Cherra-side); *Dieng-soh-rany*, *Dieng-kabra*, Synt.; *Babari*, Garo (Tura); *Khati*, Garo (Damra); *Bol-thekachu*, i. e., wild mango, Garo (Dambu); *Bombal* (Lush.)

A fairly large tree up to 80 ft. in height and 7 ft. in girth. *Bark* corky, rather rough, grey outside, reddish-brown inside, granular, exuding from the inner layers a thin watery acrid sap which turns black after exposure. *Leaves* somewhat resembling those of the mango tree, 4-10 by 1.5-2.5 in., oblong-lanceolate or oblanceolate, abruptly acuminate, quite entire, coriaceous, glabrous, shining above, glaucous beneath; lateral nerves 18-24 on either

half of the midrib, very prominent and shining beneath, slightly arched; tertiary nerves reticulate; base cuneate; petiole '5-'7 in. long, stout, channelled above, not spurred. *Flowers* white, about '1 in. across; males sessile, females on slender puberulous pedicels, in axillary, fascicled, pubescent, racemose panicles, often below the leaves and usually shorter than them. *Calyx* superior; lobes 5, oblong-acute, imbricate. *Petals* 5, orbicular or ovate, imbricate. *Stamens* 5; filaments short, inserted at the base of the annular disk. *Ovary* inferior, 1-celled, 1-ovuled; style 1. *Drupe* about 1 by '6 in., transversely oblong or ovoid, surmounted by the remains of the calyx, dark glossy green with minute yellowish dots while young, red when fully ripe. *Cotyledons* equal, plano-convex.

In shady places, often along streams, throughout the PROVINCE and up to 4,000 ft. in the HILLS.

Wood yellowish grey, but liable to be discoloured, close-grained, moderately hard, medullary rays fine, joined by very fine transverse lines. Said to be used for canoes and planking. According to Gamble it is the wood most employed for boats in Chittagong.

Fls. 9-11. Fr. 11-4.

6. LANNEA A. Rich.

(Odina Roxb).

Lannea grandis A. Rich. Syn. *Odina* Wodier Roxb. Sans. *Jingni*. Vern. *Jia*, Ass., Beng., & Mech., *Jiyal*, Beng. (Sylh.); *Kai-engla*, *Khai-engla*, Sylh. (perhaps wrongly); *Adalia Poma*, *Madabai* or *Mandamai*, Cach.; *Dieng-thang*, *Dieng-soh-knurnot* (Burnihat), *Dieng-sur*, *Dieng-khang*, *Dieng-pasoh-pier* (Shella), *Dieng-tang-leng*, *Soh-lapeit-synrang*, Khasi; *Dume*, *Dome*, *Bol-chigamba*, *Bol-agru*, Garo; *Thing-khoi-nath*, Kuki; *Toi-sing-taite*, Tipp.; *Jika*, *Jiga*, Jharua; *Hulurhe*, Nep.; *Tiji-arong*, Mik.

A small to middle sized deciduous tree with thick branchlets. *Bark* thick, grey or greyish black, smooth and slightly wrinkled when young, afterwards rough and fissured, exfoliating in thin round plates, exposing a greyish or pinkish-white surface; blaze red, streaked with irregular white or pink streaks, fibrous. *Young parts* and inflorescence deciduous stellate-pubescent or almost tomentose. *Leaves* crowded at the ends of branches, alternate, 12-18 in. long, imparipinnate; common petiole terete. *Leaflets* 5-11, opposite, shortly petiolulate or nearly sessile, 3-6 by 2-3½ in., ovate, elliptic or lanceolate, acuminate; base often oblique, rather membranous, often slightly puberulous when young, glabrous with age; lateral nerves 6-10—sometimes more, on either side of mid-rib, petiolule upto '1 in. *Flowers* small, '15-'12 in. across, yellowish-green, usually diœcious, rarely monœcious, 4-rarely 5-merous, fascicled on the branches of slender racemes, which are crowded at the ends of branches; *males* usually longer and compound, *females* usually simple, elongating in fruit.

Calyx imbricate in bud, persistent in female flowers, ovate, ciliate. *Petals* about twice the calyx lobes or longer, '1-12 in. long, usually purplish in the middle, imbricate in bud, spreading, oblong, acute in the male flowers, longer and obtuse in female flowers. *Disc* annular, 8-lobed. *Male flowers* :—stamens usually 8, rarely 10 (?) inserted on the margin of the disc; pistillode 4-rarely 5-cleft. *Female flowers* :—staminodes small; ovary 4-6 lobed, 1-celled; styles 3-6 short; stigma papillose; ovule solitary, pendulous from the apex. *Drupe* upto '6 in. long, usually red when ripe, seated on the somewhat enlarged calyx, curved, oblong, laterally somewhat compressed; stone large, pitted,

Common throughout the Province, specially in deciduous types of forests, but not recorded from the N. E. FRONTIER DISTRICT, ascending to 3000 ft. in the hills.

Sapwood white, soft and perishable. Heartwood red when fresh cut turning to reddish brown after exposure, much prized in Sylhet for posts. Weight 50-60 lbs. per c. ft. A useful gum can be obtained by making cuts in the sapwood. The leaves are greedily eaten by cattle and elephants are fond of the young shoots. The tree can be most easily propagated by cuttings of all sizes, and live house-posts are a very common sight in Bengal villages.

Fls. 3-4 Fr. 4-6. New leaves 5-6. Leaves turn yellow before falling.

7. TAPIRIA Juss.

Tapiria hirsuta Hk. f. Vern. *Dhindau-baguri lata*, Ass. (Darr.); *Midi-takkir*, Miri & Abor; *Du-cheng-brup*, Garo; *Hang-Ding*, Mik.; *Chutti-lara*, Nep.

A fairly heavy scandent shrub, hirsute or villous throughout. *Bark* black on mature stems, peeling off in strips exposing a brown surface, greenish brown inside. *Leaves* imparipinnate, 8-15 in. long; common petiole terete, villous. *Leaflets* 11-15, lateral opposite, 1-4 by '5-1'5 in., ovate oblong or lanceolate, acuminate, distantly crenulate-serrate, membranous, tomentose hirsute or strigose, more densely on the under surface; lateral nerves 6-9 on either half, slender, evenly arched; base rounded or subcordate, more or less oblique; petiolules '1-2 in. long. *Panicles* axillary or sub-terminal, 5-12 in. long with spreading ramifications. *Flowers* polygamous, very small, white, sweet scented; pedicels capillary, '05-15 in. long, nearly glabrous. *Calyx* 5-lobed, persistent, lobes ovate. *Petals* 5, oblong or elliptic oblong, imbricate. *Disk* yellow, 5-lobed. *Stamens* 10, inserted at the base of the disk; anthers globose. *Ovary* 5-lobed, each lobe with a style, but 1-celled and 1 ovuled. *Drupe* about '3 by '25 in., obliquely oblong, black when ripe with a subacid aromatic flesh; stone rugose; crustaceous.

Throughout the PROVINCE ascending to 4,000 ft. in the Hills, generally in scrub forest and on old jhums.

The Mikirs eat the leaves as a vegetable. The ripe fruit is eaten. The Garos use the juice of the plant to dress cuts and other wounds probably as an antiseptic.

Fls. 1-3. Fr. 4-5.

8. SPONDIAS Linn.

Glabrous trees. *Leaves* imparipinnate, usually crowded at the ends of the branchlets; leaflets opposite or subopposite. *Flowers* small, polygamous, generally in large terminal panicles. *Calyx* inferior, small, 4-6-fid; lobes slightly imbricate. *Petals* 4-6, subvalvate, spreading. *Disk* cup-shaped, thick, slightly lobed. *Stamens* 8-10, inserted beneath the disk. *Ovary* superior, 4-6-celled, each cell with a solitary pendulous ovule; styles 4-6, conniving or erect. *Drupe* large, fleshy, terete with a 1-6-celled hard stone; cotyledons elongate, radicle superior.

Leaflets broad, abruptly acuminate, always entire with a strong intramarginal nerve. Flowers congested, subsessile. *Drupe* 1.5-2 in. long.

Leaflets narrow, tapering acuminate, serrate on young shoots, with no intramarginal nerves. Flowers scattered on long filiform pedicels. *Drupe* scarcely exceeding 1 in. in length.

.. 1. *S. mangifera*.

.. 2. *S. axillaris*.

1. *Spondias mangifera* willd. Sans. *Amrataka*. Vern. *Amor*, *Amora*, *Amratenga*, Ass., *Amra*, Beng. *Dergi-asing*, Miri & Abor; *Thaisudi-phang*, Kach.; *Suming-* or *Chiming-arong*, Mik.; *Dieng-soh-pair* (*pyjer* or *-pier*) *Dieng-soh-pair-kanthai*; Khasi; *Ambri-thong*, *Ambi-thong*, *Thong-rong*, Garo; *Tamxen*, Naga; *Heining*, Manip.; *Tai-to-thing*, *Toito*, Kuki.

A middle-sized tree with a pleasant aromatic smell. *Bark* brown or grey, plain but often with horizontal wrinkles and light vertical fissures, soft; inside reddish-brown with vertical streaks of lighter colour, .25-.3 in. apart. *Leaves* 1-1.5 ft. long; common petiole terete, slender. *Leaflets* 9-13, 2-9 by 1-4 in., elliptic-oblong, always quite entire, abruptly long acuminate, membranous, shining, lateral more or less oblique, turning yellow before falling; lateral nerves 10-30 on either half, straight, parallel; nearly transverse, joined by a strong intramarginal nerve; petiolules about .2 in. long. *Flowers* ploygamous, .2 in. across, scented, subsessile, in spreading terminal panicles. *Calyx* salver-shaped with 5-6 acute lobes which are deciduous. *Petals* as many as calyx-lobes, greenish-white, about .1 in. long, ovate-oblong, acute, glabrous. *Disk* broad, fleshy, usually 5-lobed. *Stamens* twice the number of petals; filaments short, subulate; anthers versatile. *Ovary* of 4-6 carpels which are free above, each with a short conniving style. *Drupe* 1.5-2 in. long, ovoid or oblong, greenish-yellow when ripe; pulp soft, acid, aromatic; stone semi-woody, fibrous with many cavities outside, 1-5 celled, cells opening by cavities through the top of the stone; seeds 1-5 of which, however, not more than 1-3 are perfect.

Throughout the plains in both the VALLEYS and up to 3,000 ft. in the HILLS, generally affecting deciduous forests or open spots.

Wood soft, light-grey, very porous, weighing about 26 lbs. per c. ft., of no use. The tree is often attacked by insects and from the holes made by

them a gum exudes which is insoluble in water. The fruit is eaten when ripe, also pickled or made into curries when green and tender. The aromatic flower-buds also make a very agreeable curry. The trees can be very easily propagated from cuttings.

Leafless 12-3. Fls. 3-5. fr. 11-2.

2. *Spondias axillaris* Roxb. Vern. *Khamoli-sali*, *Khamoli-mola*, Ass. (Sibs.); *Hamoi-tenga*, Ass. (Darr.); *Belam-asing*, Abor & Miri; *Belam-changne*, Duff.; *Theseli-arong*, Mik.; *Aming-gok*, *Amung-gok*, *Agimmok*, Garo; *Dieng-salaat*, Synt.; *Nihor*, Jharua (Dalu, Garo Hills); *Lobshi*, Nöp.

Usually a small evergreen tree attaining in favourable localities about 80 ft. in height and 7 ft. in. girth, with thin horizontal branches. *Bark* on branches and young plants greenish-brown, plain and shining but with large warts; on old stems dark-grey to black, reticulately fissured and splitting in thin long strips; inside light-red in thin concentric plates. *Leaves* 12-18 in. long; common petiole terete, slender. *Leaflets* 7-17, generally opposite, 2-4 by 7-1.5 in., ovate, lanceolate or oblong-lanceolate, caudate or acuminate; base cuneate to rounded, oblique on the leaflets,—from distantly but deeply serrate on young plants, to subentire on mature trees, membranous, puberulous on the nerves and along the margin when young, glabrous with age except for tufts of hair on the axils of nerves beneath, undersurface pale; main lateral nerves 10-12 on either half, joined by an intramarginal nerve, tertiary nerves very fine, closely reticulate; petiolules slender, slightly channelled, lateral —1.2 in., terminal 5.8 in. long. *Flowers* polygamous, pentamerous, greenish-white. **MALE FLOWERS**—15 in. across in panicles 3-6 in. long, usually crowded towards the base of the shoots, axillary and extra-axillary, panicle branches slender; pedicels up to 1 in. long, filiform. *Calyx* cup-shaped, lobes elliptic or ovate, ciliate. *Petals* elliptic. *Stamens* 10; filaments slightly subulate, short; anthers large, oblong; disk rather obscure, pistillode 0. **HERMAPHRODITE or FERTILE FLOWERS**—25 in. across, solitary on stout peduncles up to 6 in. long or on short few flowered racemes; pedicels up to 2.5 in. long. *Stamens* 10; disk annular, 10 lobed. *Ovary* 5 celled with 5 erect styles. *Drupe* 1.1-2 by .8 in., oblong, yellow when ripe, flesh fibrous, white when ripe, very acid, stone .6-.8 by .3-.5 in., horny, shallow-pitted all over and with 5 prominent depressions at the top, 5 celled; seeds with membranous testa and oily cotyledons.

Common in all submontane tracts and up to 4,000 ft. in the HILLS, though somewhat rare in the Sadar Sub-Division of the KHASI HILLS. Very common in some parts of the GARO, JAINTIA and NORTH CACHAR HILLS.

It appears from King and Prain's description in *Annals of Royal Botanic Garden, Calcutta*—Vol. IX. P. 25, that the plants examined by them bore no male flowers, and the plants raised from seeds in the Botanic Gardens bore only hermaphrodite flowers. The forms producing male flowers should be further examined in the field for correlated difference.

The wood is greyish-white, soft and light, not of much use. The inner bark is chewed by most hill-people and certain classes of Assamese as a substitute for Areca-nut. The ripe fruit is eaten.

Fls. 2-4. Fr. 7-12.

FAM 48. MORINGACEÆ.

Deciduous trees with corky bark and soft spongy wood. *Leaves* alternate, imparipinnate, twice or thrice compound; leaflets opposite, entire; stipules 0. *Flowers* 2-sexual, irregular, whitish or pinkish, in axillary and terminal panicles. *Calyx* cup-shaped; segments 5, petaloid. *Petals* unequal, erect, spreading. *Disk* thin, lining the calyx tube. *Perfect stamens* 5, opposite the petals, alternating with 5 antherless filaments, all inserted on the edge on the disk and all declinate; anthers 1-celled. *Ovary* stalked, lanceolate, 1-celled; ovules numerous on parietal placentas; style slender. *Fruit* a pod-like capsule, rostrate, 3-angled, 3-valved. *Seeds* many, usually winged; albumen 0.

MORINGA Lamk.

Moringa pterygosperma Gaertn. Vern. *Saijna*, *Sohjna*, Beng. & Hind., *Sajina*, Ass.

A middle-sized tree with thick corky bark, the inner layers exuding a red resinous gum; roots pungent. *Leaves* 1-2.5 ft. long, usually 3-pinnate; petiole sheathing at the base; pinnæ 4-6 pairs, opposite; pinnae 6-9 pairs, opposite, the uppermost pair 1-foliolate, a hairy gland between each pair of pinnæ and pinnulae. *Leaflets* 4-8 in. long, ovate or elliptic, entire, membranous, pale beneath; veins invisible. *Flowers* 1 in. across, strongly honey-scented. *Sepals* petaloid, linear-lanceolate, reflexed. *Petals* linear-spathulate, white but with yellow dots above near the base. *Filaments* villous. *Ovary* hairy. *Capsule* 9-20 by 6-8 in., 3-gonous, longitudinally ribbed, slightly constricted between the seeds. *Seeds* 3-gonous, winged along the corners, about 1 in. long including the wings.

Planted in homesteads and almost universally in coolie lines in tea gardens of both VALLEYS chiefly for the fruits which are used as a vegetable. The tender leaves and flowers are also eaten; cooked. The pungent roots, bark and gum are used medicinally. Wood very soft and very porous, absolutely useless.

Fls. 1-3. Fr. 3-5.

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OF

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(*Ass.* means Assamese ; *Beng.* Bengali ; *Cach.* Cachar or Cachari ; *Daff.* Daffla ; *Kach.* Kachari ; *Kh.* Khasi ; *Lush.* Lushai ; *Manip.* Manipuri ; *Mik.* Mikir ; *Nep.* Nepali ; *Sans.* Sanskrit ; *Syl.* or *Sylh.* Sylhet ; *Synt.* Synteng ; *Tipp.* Tippera.)

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FLORA OF ASSAM

BY

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Late Extra Deputy Conservator of Forests, Assam.

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Deputy Conservator of Forests, U. P.

AND

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VOL. II.

CONNARACEÆ TO CORNACEÆ.



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PREFACE.

The original draft of this Volume (*Calycifloræ*) was completed in 1932 by Mr. P. C. Kanjilal, B.Sc., I.F.S., of the United Provinces. Considerable time has elapsed before this Volume could be taken in hands for publication. During this period many species have been discovered and described and a number of alterations have been made in the nomenclature.

I lost touch with the publication of the Volumes of the "Flora of Assam" since my retirement in December, 1934.

I have now been asked to take up the work of editing and publishing all the remaining Volumes of the "Flora." The task is arduous, specially so, as I am not afforded facilities to consult the herbarium and library of the Royal Botanic Garden, Sibpur. It is impossible to do justice to a work of this nature without facilities for ready reference.

I have since described as many as 40 species, which have been embodied in this work in small types, and in many cases it has not been practicable to include them in the keys without seriously interfering with the progress of printing work.

The following species have appeared in the body of this Volume in their old nomenclature which could not be altered in time:—

CORRECT MODERN NAME.

NAME USED IN THIS VOLUME.

Santaloides caudatum (Planch)

O. Kuntze.

Rourea caudata Planch.

Indigofera glabra Linn.

I. pentaphylla Linn.

Pongamia pinnata (Linn) Therr.

P. glabra Vent.

Delonix regia Raf.

Poinciana regia Boj.

Prunus Puddum Roxb.

P. cerasoides Don.

CORRECT MODERN NAME.	NAME USED IN THIS VOLUME.
<i>Sorbus cuspidata</i> Hedl.	<i>Pyrus cuspidata</i> Bertol.
<i>Bergenia ligulata</i> (Wall) Engl.	<i>Saxifraga ligulata</i> Wall.
<i>Carallia brachiata</i> (Lour) Therr.	<i>C. integerrima</i> DC.= <i>C. lucida</i> Kurz.
<i>Terminalia tomentosa</i> W. & A.	<i>T. tomentosa</i> Bedd. Var. <i>typica</i> .
<i>Eugenia cumini</i> (Linn) Druce.	<i>E. jambolana</i> Lam.
<i>Psidium Guajava</i> Linn.	<i>P. Guyava</i> Linn.
<i>Rotala indica</i> Kæhne.	<i>Ammannia peploides</i> Spreng.
<i>Rotala rotundifolia</i> Kæhne.	<i>Ammannia rotundifolia</i> Ham.
<i>Epilobium trichoneurum</i> Hausk.	<i>E. Hookeri</i> C. B. Clarke.
<i>Woodfordia floribunda</i> Salisb.	<i>W. fruticosa</i> Kurz.
<i>Mollugo pentaphylla</i> Linn.	<i>M. stricta</i> Linn.
<i>Mollugo lotoides</i> O. Kuntze.	<i>M. hirta</i> Thunb.
<i>Mollugo oppositifolia</i> Linn.	<i>M. Spergula</i> Linn.
<i>Centella asiatica</i>	<i>Hydrocotyle asiatica</i> Linn.
<i>Hydrocotyle sibthoropioides</i> Lam.	<i>H. rotundifolia</i> Roxb.

Some species have been described and put in the addenda as otherwise the publication of this Volume would have been unusually delayed.

I must first gratefully acknowledge the valued assistance of Mr. R. N. De, B.Sc., I.F.S., Forest Botanist, Assam, in his careful reading of the proof and hearty co-operation in every direction.

I am personally indebted to Dr. K. Biswas, M.A., D.Sc., F.R.S.E., and Mr. V. Narayanswami of Royal Botanic Garden, Calcutta, for their ungrudging help in all possible directions.

My grateful acknowledgments are also due to Mr. C. E. C. Fischer of Kew Gardens, for material assistance in revising the nomenclature and incorporating new records and new species from Assam, in this Volume.

It has not been possible to avoid printers' mistakes in spite of repeated proof-reading.

A. DAS.

SHILLONG,
10th February, 1938.

INTRODUCTION.

The materials for this Volume of the "Flora of Assam" were mainly collected by the late Rai Bahadur U. N. Kanjilal, F.L.S. His son, Mr. P. C. Kanjilal, I.F.S., of the United Provinces who was deputed to Assam to act as Botanical Forest Officer wrote the manuscript of this volume and revised his father's descriptions. His successor in office, Mr. A. Das, I.F.S., now retired, described and added some more species.

It is unfortunate that none of these officers are now in service in Assam and to my predecessor, Dr. N. L. Bor, I.F.S., and me as Botanical Forest Officer, has fallen the task of publication of the remaining parts of the "Flora of Assam." I have used my pen freely in correcting all mistakes that have caught my eye and I have been very ably assisted in proof-reading by my Botanical Assistant, Babu Banka Bihari Syam to whom my thanks are due. Every endeavour has been made to eliminate mistakes and it is hoped that some measure of success has been achieved.

R. N. DE, I.F.S.

Botanical Forest Officer, Assam.

SHILLONG,

14th February, 1938.

FLORA OF ASSAM

CALYCIFLORÆ.

FAM. 49. CONNARACEÆ.

Mostly woody climbers, rarely erect shrubs, more rarely trees. *Leaves* alternate, imparipinnate or 1-3-foliolate, exstipulate; leaflets quite entire. *Flowers* usually 2-sexual and regular, 5-merous, in racemes or panicles. *Calyx* imbricate or valvate, usually persistent. *Petals* narrow, free or nearly so. *Disk* obsolete. *Stamens* 10, 5 against and 5 between the petals, the former usually shorter and imperfect; filaments generally connate at the base. *Carpels* 5, each usually with 2 collateral ovules, usually only one carpel developing into fruit. *Fruit* of one, rarely 2, 1-seeded 2-valved follicular capsules; seed 1, often arillate, exalbuminous; radicle superior.

Calyx accrescent, lobes orbicular. Follicle sessile.	1. Rourea.
Calyx not accrescent, lobes elongate. Follicle stipitate.	2. Connarus.

1. ROUREA Abul.

Leaves imparipinnate; leaflets sub-opposite or alternate. *Flowers* small in axillary panicles. *Sepals* 5, orbicular, imbricate, much enlarged in fruit. *Petals* 5, usually oblong. *Carpels* 5, only 1 perfect. *Capsule* sessile, curved or crescent-shaped; seed solitary, erect, arillate, exalbuminous.

Leaflets subcoriaceous, sepals not ciliate, much shorter than the petals; follicle usually much curved.	1. <i>R. commutata.</i>
Leaflets chartaceous. Sepals slightly ciliate, about as long as the petals; follicle slightly curved and obliquely oblong.	2. <i>R. caudata.</i>

1. *Rourea commutata* Planch.

A large glabrous evergreen scandent shrub. *Leaves* 8-12 in. long; common petiole stout, terete. *Leaflets* usually 5-9, rarely up to 13, more or less alternate, 3-7 by .8-2.5 in., oblong to ovate lanceolate, more or less rounded or subacute at the base, abruptly acuminate with a blunt tail, subcoriaceous, shining on both surfaces; main lateral nerves 3-5 on either half, anastomosing near the margin and with many shorter intermediate ones, the lower two much arched and extended up to the middle of the leaflet often even beyond; petiolules .1-.2 in. long, stout. *Flowers* white, small, in much branched axillary panicles. *Sepals* about .08 in. long, orbicular or slightly ovate. *Petals* about 1.5 in. long, obovate-oblong. *Styles* recurved, longer than the petals. *Follicles* about 1 in. long, oblique, curved and tapering to a point, opening by the inner suture; seed about .7 in. long, oblong, completely enveloped by a bright red aril.

Occurs in evergreen forests of the LAKHIMPUR and SIBSAGAR DISTRICTS, also in the KHASI HILLS.

The aril of the ripe fruit is eaten.

Flrs. 5-6. Fr. 7-8.

2. *Rourea caudata* Planch.

A woody climber very similar in appearance to the foregoing species. *Common petiole* more slender; leaflets thinner, slightly smaller, with a longer tail; main lateral nerves up to about 8 on either half. *Panicles* axillary, fascicled, 2-5 in. long; pedicels capillary, .2-.3 in. long. *Sepals* about .15 in. long, ovate-oblong, ciliate, enveloping the petals. *Style* much exceeding the petals. *Follicle* somewhat smaller, obliquely oblong, only slightly curved, clasped at the base and for about a third of its length by the accrescent calyx.

KHASI and JAINTIA HILLS, e.g., near Mynso, also NOWGONG, SIBSAGAR and the DUFFLA HILLS.

Flrs. 9-11. Fr. 12-2.

2. CONNARUS Linn.

Connarus paniculatus Roxb. Vern. *Makoi-lata*, Ass., *Kobelahu*, *The-phlop-phlop*, *Rikang-tomdak*, Mik.; *Hlu-plu*, *Met-puk*, *Lushai*.

A large woody climber. *Bark* rough, dark-brown or black, yellowish to reddish inside according to age. *Leaves* imparipinnate; rachis $\cdot 3\cdot 7\cdot 5$ in. long, terete. *Leaflets* 3-7, usually 5, 3-8 by 1-2-5 in., elliptic lanceolate or oblong, bluntly short-acuminate, quite entire, thinly coriaceous, perfectly glabrous and shining, subacute or slightly rounded at base; main lateral nerves 5-7 on either half, very oblique and much arched, slender; petiolules $\cdot 2\cdot 3$ in. long, very stout. *Flowers* white, $\cdot 2\cdot 3$ in. long, cymosely arranged on the branches of rusty pubescent, mostly terminal panicles 5-12 in. long; pedicels up to $\cdot 1$ in. long; bracts minute. *Calyx* lobes $\cdot 5$ in. long, imbricate, oblong, thick and persistent but not accrescent in fruit, pubescent outside. *Petals* twice as long as the calyx, linear oblong, narrowed towards the base, membranous, nearly glabrous, dull-white. *Stamens* 10, alternately much shorter and sterile; filaments pubescent. *Carpels* 5, 4 imperfect, the 5th with a slender style, villous. *Follicles* 1-2-1-5 by $\cdot 6\cdot 8$ in., inflated, slightly compressed, on a thick stipe and supported by the persistent calyx, shining and obliquely striated outside; valves more or less pubescent inside. *Seed* black, $\cdot 7\cdot 9$ by $\cdot 5\cdot 6$ in., much compressed; aril small, reaching about a quarter of the length of the seed, with a crenate margin; cotyledone oily.

Fairly common throughout the plains and up to 4,000 ft., in the HILLS, generally in evergreen types of forest.

The oil of the seeds may be found suitable for soap-making.

Flrs. 2-4. Fr. 3-5.

FAM. 50. LEGUMINOSÆ.

Trees, shrubs or herbs. *Leaves* alternate, usually compound, stipulate. *Flowers* 2-sexual, regular or irregular, bracteate, arranged singly or in heads, on simple racemes or panicles of racemes, rarely in single heads. *Sepals* 5, usually connate, often 2-lipped, rarely free, odd lobe usually anterior. *Petals* 5, rarely the 5th suppressed, free, but usually combined when the flowers are in heads. *Stamens*

normally 10, sometimes fewer by suppression or indefinite when the flowers are in heads; filaments free or variously combined; anthers 2-celled with longitudinal dehiscence. *Ovary* free, often stipitate; carpel solitary; ovules on the ventral suture of the carpel. *Fruit* a legume (pod), usually dehiscent along one or both sutures. *Seeds* flat or more or less compressed, generally exalbuminous; testa horny or coriaceous.

This very large and important Family is divided into three Sub-Families :—

Flowers irregular. Petals unequal, free, imbricate; stamens up to 10 :—

Stamens diadelphous, less frequently free or monadelphous; calyx gamosepalous; petals descending, imbricate (posterior petal outermost) usually largest ..

1. Papilionatæ.

Stamens free; calyx divided to or nearly to the base; petals ascending, imbricate (posterior petal innermost)... ..

2. Cæsalpinioidæ.

Flowers regular. Petals equal, more or less connate, valvate; stamens usually indefinite.

3. Mimosoidæ.

Sub-family I. PAPILIONATÆ. (Leguminosæ)

Herbs, shrubs or trees. *Leaves* usually pinnate, less commonly digitate, rarely simple; leaflets often stipellate. *Flowers* 2-sexual, irregular and of the characteristic papilionaceous type, as described below. *Calyx* gamosepalous, 2-lipped. *Corolla* of 5-imbricate petals, which are more or less clawed, the two innermost (which are also anterior) similar, free or connate into a more or less boat-shaped sheath encasing the ovary; these are called *keel* petals. The next two petals are immediately outside the keel, also similar and are called the *wings*. The fifth is the outermost or odd petal called the *standard*, which is posterior in position and generally broader than the others and reflexed. *Stamens* generally 10, diadelphous, sometimes monadelphous, rarely all free, inserted with the petals on the calyx-tube; anthers often versatile. *Pod* dry, generally dehiscent, sometimes indehiscent. *Seeds* exalbuminous or albuminous.

Artificial key to the Papilionatæ.

- Tribe I. **PODALYRIÆ**. Stamens free. Pod dehiscent, leaves digitate :—
 A shrub; stipules connate. .. 1. *Piptanthus*.
- Tribe II. **GENISTEÆ**. Herbs or shrubs. Leaves simple or digitately trifoliate; leaflets entire; stamens monadelphous; pod dehiscent, not jointed :—
 Pods flattened. A shrub. .. 2. *Priotropis*.
 Pods turgid. Herbs or under-shrubs. .. 3. *Crotalaria*.
- Tribe III. **TRIFOLIÆ**. Herbs; leaves 3 foliolate; leaflets toothed :—
 Flowers blue; petals early deciduous; a trailing herb. .. *Parochetus*.
- Tribe IV. **GATEGEÆ**. Herbs or shrubs, sometimes climbing; leaves imparipinnate; leaflets usually entire; stamens usually diadelphous; pod dehiscent, not jointed; stipellæ usually absent :—
 I. Hairs fixed by the middle; anthers apiculate. .. 4. *Indigofera*.
 II. Hairs basifixed; anthers obtuse :—
 A. Pods flattened, continuous; leaves imparipinnate :—
 Pods tardily dehiscent; shrubs or climbers. .. 5. *Millettia*.
 Pods soon dehiscing .. 6. *Tephrosia*.
 B. Pods long, slender, septate; leaves usually paripinnate; inflorescence axillary. .. 7. *Sesbania*.
- Tribe V. **HEDYSAREÆ**. Herbs or shrubs, sometimes climbing; leaves usually imparipinnate, (exc. *Smithia*) rarely 1-foliolate; stamens diadelphous or monadelphous; pod jointed or 1-seeded :—
 I. Leaflets not stipellate :—
 A. Stamens in bundles of 9 & 1; ovule solitary. .. 8. *Lespedeza*.
 B. Stamens in bundles or 5+5 :—
 Joints of pod folded inside calyx. .. 9. *Smithia*.
 Pod straight, exserted. .. 10. *Æschynomene*.
 II. Leaflets stipellate :—
 A. Pods twisted up inside the calyx. .. 11. *Uraria*.

- B. Pods not twisted up inside the calyx. 12. *Desmodium*.

Tribe VI. *VICIEÆ*. Climbers or low herbs; leaves paripinnate, ending in a bristle or tendril; stamens diadelphous or monadelphous by abortion; pod not jointed, dehiscent :—
 Stamens 9, (the posterior absent); a climber. 13. *Abrus*.

Tribe VII. *PHASEOLEÆ*. Usually climbers, rarely trees or erect shrubs; leaves pinnately 3-foliolate (digitate in *Flemingia*), stipellate—or exstipellate and then gland-dotted; pods not jointed, dehiscent; stamens 1-2 adelphous :—

I. Leaves not gland-dotted :—

A. Nodes of raceme not tumid; petals about equal in length; style not bearded :—

1. Stamens diadelphous, all fertile; stipules and bracts persistent :—
 Style filiform. Calyx teeth distinct. 14. *Shuteria*.

Style flattened upwards. Calyx truncate. 15. *Dumasia*.

2. Stamens monadelphous, alternately sterile and short; stipules and bracts minute, caducous. 16. *Teramnus*.

B. Racemes tumid at the nodes; style not bearded :—

1. Petals very unequal :—
 Climbers; keel exceeding the wings and the standard. 17. *Mucuna*.

Trees or undershrubs; standard exceeding the keel. 18. *Erythrina*.

2. Petals about equal in length :—

a. Stamens diadelphous :—

- i. Pods not winged, 1-seeded, dehiscent at the 1-seeded tip only :—

- Flowers large,
showy, usually
in racemes. . . 19. *Butea*.
Flowers small,
usually
panicked. A
sinistorse
climber. . . 20. *Spatholobus*.
- ii. Pod winged,
many seeded,
tardily dehiscent. 21. *Mastersia*.
- b. Stamens monadelphous :—
Upper lip of
calyx projecting;
lobes connate. . . 22. *Canavalia*.
Calyx teeth sub-
equal, upper con-
nate :—
Pod oblong, tur-
gid, 1-2 seeded. 23. *Dioclea*.
Pod linear, flat,
many seeded. . . 24. *Pueraria*.
- C. Racemes usually tumid at
the nodes; style bearded :—
1. Stigma oblique :—
- a. Keel spirally beaked :—
Keel forming com-
plete spiral; pod
more or less com-
pressed. . . 25. *Phaseolus*.
Keel beaked but
not forming a
spiral; pod sub-
terete. . . 26. *Dysolobium*.
- b. Keel incurved, some-
times slightly twist-
ed. . . 27. *Vigna*.
2. Stigma terminal :—
Petals about equal in
length. . . 28. *Dolichos*.
Petals very unequal
in length; flowers
showy. . . 29. *Clitoria*.
- II. Leaves gland dotted; stipellæ
often abortive; nodes or
racemes not tumid :—
- A. Ovules 1-2; pod not de-
pressed between the seeds :—

Leaves digitately 3-foliate or 1-foliolate. Pod turgid. Erect or prostrate under-shrubs. .. 30. *Flemingia*.

Leaves 1 foliolate; pod flattened. Erect under-shrub. .. 31. *Eriosema*.

B. Ovules 3 or more :—

1. Pod without depressed lines between the seeds. .. 32. *Dunbaria*.

2. Pod with depressed lines between each seed :—
Seed with a large grooved strophiole. .. 33. *Atylosia*.

Seed without strophiole. .. 34. *Cajanus*.

Tribe VIII. *DALBERGIEÆ*. Trees or shrubs, sometimes scandent; leaves imparipinnate; stamens 1-2 adelphous; pod indehiscent :—

Leaflets alternate. .. 35. *Dalbergia*.

Leaflets opposite :—

Pods thick, almost woody, not winged. .. 36. *Pongamia*.

Pods thin, firm, winged down one or both sutures. .. 37. *Derris*.

Tribe IX. *SOPHOREÆ*. Shrubs or trees; leaves imparipinnate, rarely simple; stamens free :—

A. Leaves simple. Bract and bracteoles large, opposite, persistent. .. 38. *Dalhousiea*.

B. Leaves odd pinnate; bracts or bracteoles small :—

Pod moniliform; stigma terminal. .. 39. *Sophora*.

Pod turgid, dehiscent; stigma oblique. .. 40. *Ormosia*.

1. *PIPTANTHUS* D. Don.

Piptanthus nepalensis D. Don.

A shrub 8 to 12 ft. high, somewhat gregarious in habit. Branches green, angled or with vertical ridges and annulate with scars of fallen stipules; young shoots silky. *Leaves* digitately 3-foliolate; common petiole .7-1.5 in. long; stipules connate, opposite the petioles .2-.3 in. long, broadly

triangular, pubescent, drying brownish-grey. *Leaflets* sessile, 1.4 by .3-1 in., lanceolate or narrow elliptic, acuminate, entire, dark-green above, pale beneath and adpressed, grey pubescent when young, soon glabrate; midrib prominent beneath; main lateral nerves 8-12 on either half, faint. *Flowers* yellow, about 1.25 in. long, in short compact hairy racemes, 4-5 in. long; peduncles triquetrous; pedicels .5-.7 in. long; bracts ternate, tomentose. *Calyx* about .5 in long, campanulate, tomentose outside, deciduous from the base. *Petals* bright yellow, all clawed, 1 in. long including the claw which is about .5 in. long; standard erect, blade orbicular, notched, margins reflexed; wings obovate about as long as the blunt slightly incurved keel. *Stamens* 10, free, equal or subequal; anthers uniform. *Ovary* linear, hairy. *Pod* 3-5 by .4-.5 in., flat, continuous within, narrowed at both ends, stipe .8-1 in long. *Seeds* 3-10.

KHASI HILLS—Shillong-Jawai Road, *Prain*,—Laitlongkot, Manipur-Watt. Deserves a place in gardens for the beautiful golden-yellow flowers.

Flrs. 3-5. Fr. 9-11.

2. PRIOTROPIS W. & A.

Priotropis cytisoides W. & A. Vern. *Dieng-sha-ratoth*, *Dieng-sha-ratoth-balih*, Synt.; *Dieng-sia-kurie* or *chakuriaio*, *Dieng-toh-tari*, Khasi.

A shrub usually 6-8 ft. high, somewhat bushy in habit; branchlets, petioles and inflorescence adpressedly grey silky. *Leaves* 2-5 in. long; common petiole .5-1.5 in. long, slender, slightly channelled; stipules very short, subulate, deciduous. *Leaflets* 3, .5-2.5 by .4-1 in., oblong elliptic to lanceolate, acute at both ends; apex mucronate, entire, membranous, glabrous except along the midrib above, minutely adpressed silky beneath; midrib rounded; main lateral nerves about 8-10 on either side of the midrib, anastomosing near the margin; petiolules .05-.1 in. long; stipules minute and setaceous or 0. *Racemes* leaf-opposed or terminal, 3-5 in. long, shortly stalked, densely 10-50 flowered; pedicels about .25 in. long. *Calyx* campanulate, hairy outside, supported by a pair of bracteoles; teeth subequal. *Corolla* much exserted, pale-yellow, turning at least the standards and

wings purplish brown; standard orbicular or broad-obovate, mucronate, about .5 in. across, abruptly reflexed from the claw with two gland-like swellings at the junction of the claw, which is concave and densely silky within except at the base; wings .3 in., obliquely oblong-ovate or obovate; keel with a long pointed ascending beak exceeding the wings, clawed, ciliate towards the base; all petals finely purple veined. *Stamens* monadelphous; anthers dimorphous, 5 with small rounded and 5 with large oblong anthers. *Ovary* stalked and usually bearded along the ventral surface; style long, abruptly bent, bearded towards the top on the inner side; stigma roundish. *Pods* stalked, 1.1-1.5 by .4-.5 in., obliquely obovate-oblong, flat but somewhat turgid, tipped by the remains of the style, continuous inside, finely veined, minutely adpressed hairy; seeds 2-8, reniform, flattish, tan-brown when mature, on long slender straight funicles.

KHASI and JAINTIA HILLS 3,600 ft. in glades and grasslands; also along the waterless belt along the foot of the Himalayas in GOALPARA and KAMRUP.

Flrs. 4-8. Fr. 8-10.

3. CROTALARIA Linn.

Herbs and shrubs. *Leaves* simple or 3-foliolate, rarely 3-7 foliolate (in a few South Indian species). *Flowers* yellow, blue or purplish, in terminal or leaf opposed lax racemes. *Calyx tube* short; teeth subequal or connate and 2-lipped. *Corolla* exserted or equalling the calyx; standard generally orbicular, clawed; wings narrower and shorter; keel as long as the wings but broader, connate, much incurved, sharply beaked. *Stamens* monadelphous, forming a sheath of nine filaments open in front; anthers alternately versatile and basifixed. *Ovary* linear, sessile or stipitate, usually many-ovuled; style long, abruptly incurved at the base, bearded; stigma minute, oblique. *Pod* straight, linear or oblong, continuous within, turgid; seeds usually with a long funicle.

I. Leaves simple :—

A. Low herbaceous plants :—

.1. Corolla yellow :—

Leaves oblong, up to 1 in. in length; stipules minute, not decurrent; pod .25 in. long. ..

1. *C. humifusa*.

Leaves obovate, up to 2 in. in length; stipules decurrent; pod 1 in. long. 2. *C. ferruginea*.

Leaves oblong, up to 3 in. in length; stipules persistent, not decurrent; pod 1·2 in. long. .. 3. *C. mysorensis*.

2. Corolla light blue :—

Leaves linear obovate, up to 6 in. in length; stipules minute, not decurrent; Pod ·7 in. long. .. 4. *C. sessiliflora*.

B. Middle sized perennials :—

1. Corolla yellow :—

Branches winged with decurrent stipules; racemes lateral; pod stalked. 5. *C. alata*.

Branches tetragonous; racemes terminal and lateral; pod shortly stalked. 6. *C. tetragona*.

Branches terete, sulcate; racemes terminal and lateral; pod sessile. 7. *C. juncea*.

2. Corolla blue :—

Branches terete; racemes terminal; pod sessile. 8. *C. occulta*.

C. Generally large perennials or under-shrubs :—

Flowers in terminal heads; corolla blue; pod sessile. .. 9. *C. capitata*.

Flowers in terminal racemes; pod stalked :—

Bracts persistent; stipules leafy, persistent. 10. *C. sericea*.

Bracts minute, subpersistent; stipules minute, caducous. .. 11. *C. assamica*.

II. Leaves 3-foliolate. Racemes terminal and lateral; corolla yellow :—

Pod tetragonous, sessile, silky, 2-seeded. 12. *C. trifoliatrum*.

Pod cylindrical, stalked, glabrous, 20-30 seeded. 13. *C. striata*.

1. *Crotalaria humifusa* Grah.

A much-branched slender herb clothed with dun-brown silky hairs. *Leaves* simple, nearly sessile, up to 1 in. in length, oblong, symmetrical, membranous, glaucous beneath; stipules minute, subulate. *Racemes* leaf-opposed, 1·5-3 in. long, arched, 3-6 flowered; bracts minute. *Calyx* long-

toothed, concealing the small yellow corolla. *Pod* stalked, .2-.3 in. long, oblong, glabrous, 6-8 seeded.

In grass lands up to 5000 ft. in the KHASI HILLS.

2. *Crotalaria ferruginea* Garh.

A much branched fairly robust herb; branches conspicuously winged with persistent decurrent stipules, velvety or shaggy. *Leaves* simple, subsessile, 1-2 by .7-1 in., obovate-oblong, obtuse or rounded at the apex; stipules decurrent, persistent. *Racemes* leaf-opposed, 3-6 in. long, long-peduncled, laxly 2-8 flowered; bracts persistent. *Calyx* about .5 in. long, velvety. *Corolla* yellow, more or less included. *Pod* about 1 in. long, linear-oblong, glabrous, 20-30 seeded.

Fairly common in some parts of the plains of UPPER ASSAM. Var. *pilosissima* Benth.—has larger leaves and flowers and is more densely silky; found in the KHASI HILLS, 3-5000 ft.

3. *Crotalaria mysorensis* Roth. Vern. *Lao-soh-mynkhar*, *Khasi*.

A densely silky diffuse herb, 1-2 ft. high. *Leaves* simple, 1-3 in. long, oblong-elliptic or elliptic ovate, rounded at both ends, membranous, gland dotted, sparsely covered with long patent hairs; petiole very short; stipules .2-.3 in. long, lanceolate, not decurrent. *Racemes* terminal or sub-terminal, 4-9 in. long, long peduncled, 6-9 flowered. *Calyx* about .5 in. long, clothed with long silky hairs. *Corolla* yellow, hardly exserted. *Pod* about 1 in. long, oblong, glabrous, 20-30 seeded.

Grass-lands, specially in the HILLS; e.g., Nongston, KHASI HILLS, up to 5000 ft.

Flrs. rainy season. Fr. autumn.

4. *Crotalaria sessiliflora* Linn.

A robust perennial herb up to 7 ft. in height with ascending strigose branches. *Leaves* simple, 2-6 by .5-.8 in., linear-lanceolate, narrowed at both ends, subcoriaceous, somewhat scabrid and sparsely hirsute above, thinly silky pilose underneath; petiole .1 in. long or less; stipules setaceous, minute. *Flowers* in racemes up to 9 in. in

length or solitary from axils of leaves, deflexed, or shortly petioled; bracts and bracteoles persistent. *Calyx* about .5 in. long, deeply divided; lobes unequal, densely silky, accrescent in fruit. *Corolla* bluish-white, not exserted. *Pod* about .7 in. long, oblong, glabrous, 10-15 seeded.

Along water-courses or margins of swamps in the KHASI HILLS, specially in the Jowai Sub-Division.

Flrs. 8-9. Fr. 10-11.

5. *Crotalaria alata* Ham.

A suberect undershrub about 2 ft. high. *Leaves* simple, 1-3 in. long, obovate or ovate-oblong; apex rounded or acute, mucronate, entire, membranous, silky pubescent beneath; base often unequal; petiole very short; stipules decurrent along the internodes and ending as stiff pointed triangular flaps below the leaves. *Racemes* leaf-opposed, 2-3 flowered; peduncle long, often leafy; bracts small, persistent. *Calyx* about .4 in. long, silky, bracteolate. *Corolla* pale yellow, included. *Pod* stalked, 1.2-1.8 in. long, linear-oblong, narrowed into a stalk at base, glabrous, 30-40 seeded.

Grass-lands in UPPER ASSAM and KHASI HILLS up to 5,500 ft.

Flrs. and Fr. 12-2.

6. *Crotalaria tetragona* Roxb.

A shrub up to 6 ft. in height with 4-gonous stem and sulcate silky branches. *Leaves* 4-12 by .5-1 in., linear or lanceolate very gradually narrowed to the cuspidate tip, membranous or subcoriaceous, green and thinly pilose above, pale and densely silky pilose beneath; lateral nerves very oblique; petiole stout, .1-.15 in. long; stipules minute, setaceous or 0. *Racemes* simple, mostly terminal, 6-10 in. long, laxly 4-10 flowered; bracts setaceous, flowers handsome, lemon yellow; pedicels up to .5 in. long. *Calyx* about .7-1 in. long, densely brown-velvety; teeth very long, breaking off in the pod. *Corolla* glabrous, slightly exserted. *Pod* subsessile, 1-2 in. long, .4-.5 in. diam., oblong, persistently brown-velvety. *Seeds* 12-20, about .15 in. long, glossy dark-brown.

Grass-lands in the plains and lower hills in the drier parts of the PROVINCE.

Flrs. 9-10. Fr. 11-12.

7. Crotalaria juncea Linn. Vern. *San.* Hind. & Beng. (-Sunn); *Ausa*, Ass.

A shrub 5 or 6 ft. high, somewhat resembling the foregoing species with ascending terete but sulcate stiff and slender silky branches. *Leaves* 1·5-3·5 in. long, linear to obovate-oblong, obtuse or subacute, subcoriaceous, covered with silky hairs on both surfaces; petiole very short; stipules minute or 0. *Racemes* simple, mostly terminal up to 12 in. long, laxly 10-20 flowered; bracts minute. *Calyx* about 1 in. long, brown-velvety. *Corolla* bright yellow, glabrous, slightly exserted. *Pod* 1-1·3 in. long and about ·4 in. across, rusty-velvety. *Seeds* 10-15, brown.

Cultivated for its fibre in SYLHET and GOALPARA in ASSAM and almost universally in the plains of other provinces.

Flrs. 12-1. Fr. 2-3.

8. Crotalaria occulta Grah.

A small undershrub 2-3 ft. high having the general look of a stunted *C. sessiliflora*, with ascending branches and adpressed silky hairs. *Leaves* simple, 1·5-3 by ·3-·7 in., cuneately obovate or oblanceolate, subcoriaceous, substrigose and sometimes sparsely pilose along the midrib above, glaucous and more or less densely grey-silky beneath; petiole scarcely ·1 in. long; stipules minute, setaceous. *Racemes* terminal, peduncled, 3-7 in. long, 6-20 flowered; bracts minute. *Flowers* delightfully scented like violets. *Calyx* ·5-·6 in. long, densely brown silky. *Corolla* sky-blue, with darker blue or purple veins, glabrous, as long as or slightly exceeding the calyx. *Pod* about 1 in. long, ·25 in. broad, glabrous. *Seeds* 10-15, about ·07 in. long, kidney-shaped, glossy-brown.

Grass-lands in the hills up to 5,500 ft. Well worth cultivating in gardens for the sake of its scented flowers.

Flrs. 8-9. Fr. 9-10.

9. *Crotalaria capitata* Benth.

A bushy cæspitose shrub; stems scarcely branched. *Leaves* simple, 1-1·5 in. long, obovate or oblanceolate, subacute or rounded at the tip, subcoriaceous, green and glabrate above, silky beneath; stipules 0. *Flowers* violet blue in terminal heads or congested racemes of 6-20 flowers; bracts and bracteoles small, persistent. *Calyx* ·5 in. long, densely brown-silky. *Pod* sessile, glabrous, not exceeding the calyx.

KHASI HILLS, 5-6,000 ft.

Flrs. 8-9. Fr. 9-11.

10. *Crotalaria sericea* Retz. Vern. *Jhumjhum*, Beng.; *Atasi*, Sans.

A shrub 5-7 ft. high; branches striated, sometimes sharply tetragonous, subglabrous or clothed with short silky hairs. *Leaves* simple, 3-6 by 1·7-3 in., obovate-oblong to oblanceolate, subcoriaceous but soft, glabrous or very minutely pubescent above, finely silky beneath; lateral nerves 7-9 on either half, oblique; base cuneate; petiole ·2-·4 in. long; stipules falcate or deltoid, leafy, persistent. *Racemes* generally terminal, up to a foot long, 20-40 flowered; peduncles stout, angled; bracts ovate, foliaceous or sometimes setaceous. *Calyx* about ·5 in. long with subulate teeth, subglabrous. *Corolla* much exserted, yellow or purplish. *Pod* 2 in. long, nearly ·5 in. diam., thinly silky. *Seeds* 20-40, kidney-shaped, imbricating, in two rows.

Grass-lands in swampy localities in GOALPARA, possibly throughout LOWER ASSAM.

Flrs. and Fr. 10-3.

11. *Crotalaria assamica* Benth.

A shrub resembling the foregoing species in general appearance; branches stout, finely striated, silky. *Leaves* 2-5 by ·5-1·2 in., oblanceolate-oblong; apex obtuse or subacute, mucronate, thinly coriaceous, glabrous, but somewhat rugose above, very finely silky underneath; base cuneate; petiole ·1-·2 in. long. *Racemes* terminal, about a foot long, 20-30 flowered; bracts and bracteoles minute. *Calyx* ·5-·65 in.

long, pubescent with lanceolate teeth. *Corolla* .7-.9 in. long, golden yellow. *Pod* about 2 in. long and .65 in. across, above the middle, oblanceolate in outline, glabrous, distinctly stalked, many-seeded.

Plains of ASSAM and flats in the Jowai Sub-Division, KHASI HILLS.

Flrs. and Fr. cold season.

12. *Crotalaria trifoliastrum* Willd.

A perennial plant 2-3 ft. high, with numerous downy ascending branches. *Leaves* 3-foliolate; common petiole 1-1.2 in. long; stipules minute, setaceous. *Leaflets* .5-1 in. long, obovate-oblong, obtuse or emarginate, membranous, glabrous above, silky beneath. *Racemes* terminal and lateral up to 6 in. in length, 12-40 flowered; bracts minute. *Calyx* .12 in. long with linear teeth, silky. *Corolla* about .25 in. long, yellow, glabrous. *Pod* about .15 in. long, quadrangular, thinly silky, 2-seeded.

Believed to occur in the plains of both VALLEYS.

13. *Crotalaria striata* DC. Vern. *Ghantakaran*, Ass. (Upp. Ass.); *Jhunjhunia*, Ass. (Kam.).

A low shrub 2-4 ft. high, somewhat gregarious in habit; branches sulcate, obscurely silky. *Leaves* 3-foliolate; common petiole 2-3 in. long, slender; stipules minute, deciduous. *Leaflets* 1.5-4 in. long, obovate-oblong, obtuse or acute, membranous, green and glabrous above, pale and obscurely silky beneath; petiolules .1-.15 in. long. *Racemes* terminal and lateral, 6-12 in. long, 20-50 flowered; bracts subulate, up to .2 in. long, caducous. *Calyx* .25 in. long; teeth as long as the tube. *Corolla* about .5 in. long, yellow, striped with red, glabrous. *Pod* 1.5-2 in. long, about .25 in. across, cylindrical, glabrous. *Seeds* 20-30, about .1 in. long, kidney-shaped, tan-brown, shining.

Common and gregarious in dry gravelly or sandy beds of streams in the plains, specially in UPPER ASSAM.

The stem is capable of yielding fibre similar to the 'Sun' fibre (*Crotalaria juncea*).

Flrs. and Fr. 10-12.

PAROCHETUS Hamilt.**Parochetus communis** Hamilt.

A slender creeping herb with tufted runners. *Leaves* digitately 3-foliolate; petiole usually 2-3 in. long, filiform. *Leaflets* 3, subsessile, .5 by .5 in., broadly obovate-obtriangular or obcordate, slightly emarginate at the apex, mucronate, membranous, green and glabrous above, grey-silky beneath, ciliate. *Peduncles* 3-4 in. long, 1-2 flowered, filiform, with a pair of lanceolate bracts about an inch below the flowers, hairy above the bracts. *Calyx-tube* .25 in. long, deep, campanulate, reddish-brown, hairy outside; teeth lanceolate. *Corolla* .6-.8 in. long, blue with reddish veins; standard obovate, clawed, wings and keel much shorter than the standard. *Stamens* 2-adelphous; anthers uniform. *Style* elongated, glabrous, suddenly incurved above the base. *Pod* about 1 in. long, linear, straight, glabrous, continuous within.

Trailing on road-sides and forest paths above 4,000 ft. in the HILLS, conspicuous for its beautiful flowers. When not in flower bearing a superficial resemblance to an *Oxalis*.

Flrs. 9-10. Fr. 10-11.

4. INDIGOFERA Linn.

Herbs, undershrubs or shrubs with laterally attached hairs, occasionally intermixed with basifixed hairs. *Leaves* imparipinnate, rarely 1-foliolate or digitately 3-foliolate; leaflets usually opposite; stipules small; stipels setaceous, minute, caducous or 0. *Flowers* in axillary racemes. *Calyx* campanulate; teeth minute, subequal or the lowest longest. *Petals* purple or pink, caducous; standard ovate, obovate or orbicular, sessile or clawed; wings oblong; keel spurred on each side near the base, often slightly adnate to the wings. *Stamens* all fertile, 2-adelphous, 9 forming a sheath behind the keel, the tenth free and opposite the standard; anthers uniform, connective apiculate. *Ovary* sessile, usually many ovuled; style short, incurved, beardless; stigma capitate, usually penicillate. *Pod* usually linear-cylindrical, straight or curved, turgid, muricated, septate between the seeds. *Seeds* globose or cylindrical, often truncate.

I. Leaves imparipinnate :—**A. Flowers in racemes :—****1. Pods straight :—****a. Leaflets more than 7 not glandular hairy, mostly shrubby :—****i. Bracts 0; racemes lax flrd.; leaflets 13-19, pod 6-8 seeded, turgid, 1-1.5 in. long. . .****1. *I. leptostachya*.**

- ii. Bracts minute, shorter than the calyx; racemes many fld.; pod very long (for the genus) 2·5-3 in.—15-20 seeded, beaked. .. 2. *I. galegoides*.
- iii. Bracts exceeding the buds :—
 * Flowers mostly over ·3 in. long :—
 Racemes many fld., dense; bracts lanceolate; leaflets 11-17. Pod 1·1·5 in. long, 6-10 seeded. .. 3. *I. atropurpurea*.
 Racemes many fld.; bracts boat-shaped; leaflets 13-21, large, usually over ·6 in. long, obovate oblong. Pod 1·1·5 in. long, 8-12 seeded with broad sutures. .. 4. *I. pulchella*.
 Racemes 15-25 fld.; bracts lanceolate; leaflets 15-51, small, under ·6 in. long, narrow-oblong. Pod 1·1·5 in. long, 8-12 seeded with very broad sutures. 5. *I. Dosua*.
 * * Flowers mostly small, about ·25 in.; racemes many fld.; leaflets 9-15. Pod 6-8 seeded with broad sutures. .. 6. *I. nigrescens*.
- b. Leaflets 7-9, glandular hairy :—
 Racemes 6-12 fld. Pod 10-12 seeded. A cæspitose undershrub. .. 7. *I. viscosa*.
- c. Leaflets 3-5; racemes few fld.; undershrubs or subherbaceous plants :—
 Racemes 2-4 fld.; leaflets 5; pod 8-12 seeded. .. *I. pentaphylla*.
 Racemes 6-12 fld.; leaflets 3; pod 6-8 seeded with bordered sutures. .. *I. trifoliata*.
 Racemes 6-12 fld., leaflets 3; pod tetragonous, 6-10 seeded. .. 8. *I. trita*.
2. Pod subfalcate, slightly compressed, 2-4 seeded :—
 Racemes 10-20 fld.; flowers small; bracts exceeding the calyx; leaflets 5-15. Undershrub. 9. *I. Anil*.
- B. Flowers in 10-20 fld. heads :—
 Leaflets 7-11. Pod cylindrical-2 seeded. Herbaceous. .. *I. enneaphylla*.

II. Leaves simple. Annuals :—

Flowers in 6-10 fld. racemes; pod 1 seeded.	.. ..	<i>I. linifolia.</i>
Flowers in 4-8 fld. heads; pod 2 seeded.	.. ..	<i>I. cordifolia.</i>

1. Indigofera leptostachya DC.

A shrub up to 10 ft. in height with slender twiggy branches and silky young shoots. *Leaves* 3-4 in. long, imparipinnate. *Leaflets* 13-19, opposite, .5-1 in. long, oblanceolate or oblong, green above, glaucous beneath, glabrescent; stipels minute. *Racemes* up to 3 in. in length, long-peduncled; bracts 0. *Calyx* about .1 in. long, brown silky; teeth deltoid. *Corolla* .25-.35 in. long, pale red, canescent outside. *Pod* 1-1.5 in. long, 8 seeded, straight, turgid, glabrous, with narrow sutures.

In grass-lands in the KHASI HILLS, above 5,000 ft.

2. Indigofera galeoides DC.

A tall shrub about 12 ft. high with twiggy branches, thinly covered with adpressed hairs. *Leaves* imparipinnate, 6-12 in. long, petioled. *Leaflets* 11-15, opposite, .4-2 in. in length, oblong or obovate-oblong, mucronate, membranous, green above, glaucous and with very short adpressed hairs beneath; stipels minute. *Racemes* 2-3 in. long, dense-flowered; bracts minute. *Calyx* very small, canescent; teeth deltoid. *Corolla* pale-red, .3-.5 in. long, canescent outside. *Pod* 2.5-3 in. long, 15-20 seeded, straight, cylindrical, beaked, glabrous.

KHASI HILLS, 5000 ft., generally in shady localities.

Flrs. 6-7.

Indigofera Gerardiana Wall. Var. heterantha F. B. I.**I. heterantha Wall.**

A deciduous shrub usually up to 5 ft., but sometimes larger with white canescent branchlets. *Leaves* 1-4 in. long, short petioled; stipules setaceous. *Leaflets* 9-31, .2-.65 in., obovate or oblong-obovate, obtuse or retuse, mucronate, clothed on both sides with adpressed white hairs, pale grey beneath; stipellæ minute. *Racemes* 1-3 in. long, densely adpressed hairy; pedicels very short; bracts minute, shorter than the calyx. *Flowers* .3-.5 in., pale red or purple. *Calyx* hairy, standard and keel pubescent outside, specially towards the top. *Pod* 1-1.5 in. long, cylindrical, glabrous.

May be found in KHASI and JAINTIA HILLS between 4000 and 5000 ft.

Flrs. 5-6. Fr. 9-10.

3. *Indigofera atropurpurea* Ham.

A large shrub with twiggy branches, nearly glabrous. *Leaves* imparipinnate, up to 9 in. in length; petiole .5-2 in. long. *Leaflets* opposite, 11-17, .5-1.5 in. long, oblong or obovate or obovate-oblong, obtuse, mucronate, membranous, green above, thinly hairy or glabrescent and paler beneath, shortly stalked. *Racemes* 4-6 in. in flowers, lengthening to 9 in. in fruit, dense towards the apex; bracts about .12 in. long, subpersistent, lanceolate, acuminate, exceeding the subtended buds; pedicels short. *Flowers* .3-.4 in. long. *Calyx* about .1 in. long, obliquely campanulate with scattered white hairs outside. *Corolla* .25-.3 in. long, deep pink or dark-purplish. *Pod* 1-1.5 in. long, 6-10 seeded, slightly compressed, turgid, not narrowed into a beak.

KHASI and GARO HILLS, up to 4000 ft.

Flrs. 5-7. Fr. cold weather.

4. *Indigofera pulchella* Roxb. Vern. *Sam-nabat*, Garo.

A shrub 10-12 ft. high; stem sulcate, dark-grey, often attaining 1 in. in diam. at the base. *Leaves* imparipinnate, 3-6 in. long, shortly petioled. *Leaflets* 13-21, opposite, .6-1.5 by .3-.5 in., obovate-oblong, subcoriaceous, pale-green above, glaucous beneath with adpressed hairs on both surfaces; stipels minute or 0. *Racemes* 1-4 in. long, short peduncled, moderately compact; bracts boat-shaped and with a cusp, longer than the subtended buds; pedicels short. *Calyx* about .1 in. long, oblique, canescent; teeth short. *Corolla* .5-.8 in. long, bright red or rose-coloured; standard nearly .3 in. broad, reflexed. *Pod* 1.2-1.7 in. long, 12-seeded, straight, turgid, glabrous; sutures broad.

KHASI HILLS up to 5,000 ft. Also Rongrengiri in the GARO HILLS, 2,000 ft.

Flrs. 3-4. Fr. 8-10.

5. *Indigofera Dosua* Ham. Vern. *Dieng-sha-rato*h, Synt.

A densely grey pubescent low woody shrub. *Leaves* subsessile, 1-4 in. long; stipules setaceous. *Leaflets* 21-31, usually opposite, .25-.5 in. long, linear-oblong to elliptic-oblong, mucronate, membranous, dull-green above, glaucous beneath, densely grey or brown pubescent; stipels 0. *Racemes* 1.5-3 in. long, peduncled, densely many flowered; bracts .2-.25 in. long, narrow, lanceolate, cuspidate, silky, exceeding the buds; pedicels very short. *Calyx* about .1 in. long, densely hairy; teeth subulate. *Corolla* pink purple, .3-.5 in. long, glabrous. *Pod* 1-1.7 in. long, 8-12 seeded, straight, terete, glabrescent; sutures very broad, shortly beaked.

KHASI, GARO and MIKIR HILLS up to 6000 ft., fairly common in grass-lands.

Var. *tomentosa* also occurs in the same localities, which has longer leaves, longer and more numerous leaflets, larger racemes and more velvety bracts with a longer cusp.

Flrs. 6-7. Fr. 8-9.

6. *Indigofera nigrescens* Kurz. Vern. Dieng-soh-brah, Khasi.

A shrub 5-6 ft. high with dark-brown branches. *Leaves* 4-6 in. long; rachis slender. *Leaflets* 9-15, opposite, .6-1 by .25-.4 in., obovate or elliptic, shortly petioluled, mucronate and often emarginate at the tip, membranous, dark-green and nearly glabrous above, bluish-glaucous and with scattered bristles beneath. *Racemes* 4-5 in. long, peduncled; rachis stout, pubescent. *Flowers* numerous, uniformly dense, about .25 in. long, drooping, very shortly pedicelled bracts linear lanceolate, long pointed with setaceous margins about .1 in. long. *Calyx* about .12 in. long, pubescent with fugaceous black or dark brown hairs outside; teeth minute, deltoid. *Pod* .8-1 in. long, drooping, straight, terete, thin-walled, 6-8 seeded, at first covered with black or dark-brown hairs, but soon glabrescent; sutures not thickened; seeds sub-globose, smooth.

KHASI HILLS 4,500 ft. e.g., Riat khwang, Nongstoin etc., chiefly in grass-lands.

Flrs. 9-10. Fr. 10-11.

7. *Indigofera viscosa* Lamk.

A much-branched cæspitose undershrub up to 3 ft. in height, densely viscous throughout. *Leaves* pinnately 7-9-foliolate, up to 1·5 in. in length; leaflets opposite, membranous, glaucous and with persistent adpressed bristly hairs beneath; stipules minute. *Racemes* 6-12-flowered, about 1 in. long; flowers red. *Pod* ·75-1 in. long, 10-12 seeded, straight, faintly torulose.

Plains of both valleys.

Indigofera pentaphylla Linn.

A densely cæspitose annual with a few slender but stiff branches. *Leaves* pinnately 5-foliolate, up to about 1 in. in length; leaflets 5, opposite, obovate, membranous, glaucous beneath; stipules setaceous, persistent. *Flowers* red in short 2-4-flowered racemes. *Pod* ·5-·75 in. long, 8-12 seeded, straight and cylindrical, turgid.

Grass-lands in the plains.

Indigofera trifoliata Linn.

A much-branched perennial, usually trailing, up to 2 ft. in height. *Leaves* pinnately and subdigitately 3-foliolate; stipules minute; leaflets ·5-1 in. long, oblanceolate, ashy green above, glaucous and with black dots beneath. *Racemes* 6-12 flowered, sessile, congested. *Calyx* very small. *Corolla* about ·15 in. long, red, much exserted. *Pod* ·5-·6 in. long, 6-8 seeded, straight, deflexed, with acutely keeled sutures.

In grass-lands in the plains.

8. *Indigofera trita* Linn. fil.

An undershrub 2-3 ft. high, with slender stiff branches. *Leaves* pinnately 3-foliolate; leaflets obovate, membranous, thinly clothed with adpressed grey hairs, the terminal one stalked and up to 1·5 in. in length; stipules ·1 in. long, setaceous. *Racemes* 1-2 in. long, 6-12 flowered, much congested, often forming a terminal panicle above the uppermost leaves. *Calyx* ·12-·25 in. long, white, canescent; teeth setaceous. *Corolla* purplish, ·15-·5 in. long. *Pod* ·75-1·2 in. long, 6-10 seeded, tetragonous, obtusely keeled, glabrescent.

In grass-lands in the plains, also up to 5,500 ft. in the KHASI HILLS, e.g., Byntar.

Flrs. 9-10.

9. *Indigofera Anil* Linn.

A low undershrub up to about 4 ft. in height; stem canescent, sulcate. *Leaves* 2-3 in. long, petioled. *Leaflets* 5-15, opposite, .4-.8 in. long, obovate-oblong, shortly cuspidate, sub-coriaceous, glabrous above, adpressedly grey hairy beneath, very shortly petioluled. *Racemes* 1-1.5 in. long, peduncled, 10-20 flowered; bracts subulate, about .1 in. long. *Calyx* about .04 in. long; teeth deltoid. *Corolla* pale-orange, about .12 in. long, silky. *Pod* .3-.6 in. long, 2-4 seeded, subfalcate, slightly compressed, recurved, turgid, at first adpressed pubescent, ultimately glabrescent, upper suture broadly keeled, shortly beaked.

Near Ahotguri, Majuli Island, SIBSAGAR DISTRICT, possibly in similar other localities in the plains.

Flrs. 10-11. Fr. 11-12.

Indigofera enneaphylla Linn.

A densely cæspitose much branched trailing annual or biennial up to 18 in. in length. *Leaves* imparipinnate, 1-1.5 in. long; leaflets 7-11, alternate, oblanceolate, subcoriaceous, terminal, sessile; stipules minute. *Flowers* in dense heads of 12-20. *Calyx* .1-.15 in. long with long setaceous teeth, slightly shorter than the corolla. *Pod* .1-.15 in. long, 2-seeded, cylindrical, thinly hoary.

Believed to occur in the plains of both valleys.

Indigofera linifolia Retz. Vern. *Bhangra*, Beng.

A much branched cæspitose annual or perennial, silvery-hoary throughout, up to a foot in height. *Leaves* simple, .5-1 in. long, linear to obovate, mucronate; petiole very short; stipules minute. *Flowers* white or bright-red, in 6-12 flowered dense racemes. *Calyx* small. *Corolla* .15-.25 in., standard spurred, long. *Pod* 1-seeded, minute, globose, mucronate.

Apparently very common in grass-lands in the plains of both valleys.

Indigofera cordifolia Heyne.

A diffuse herbaceous annual of dwarfish habit. *Leaves* simple, .5-.75 in. long, ovate-cordate, mucronate, thinly pubescent above, more densely beneath; stipules minute. *Flowers* bright-red but hidden inside the long-toothed downy calyx, in 4-8 flowered sessile heads. *Pod* .25 in. long, pubescent, usually 2-seeded.

Inconspicuous but common in grass-lands in the plains.

Cicer arietinum Linn. Vern. *But-mah*, Ass.; *Chhola*, *But-kalai*, Beng.; Gram or horse gram, Eng.

A viscous annual herb. *Leaves* usually imparipinnate; stipules

large. *Leaflets* many, rigid, deeply toothed, strongly veined; stipels 0. *Flowers* bluish-purple, axillary, solitary. *Calyx-tube* oblique; teeth unequal. *Corolla* exserted; standard broad. *Stamens* diadelphous (9+1). *Staminal* tube with an oblique mouth. *Style* beardless, persistent. *Pod* sessile, turgid, 2-seeded. *Seeds* beaked and with a slender funicle; cotyledons yellow.

Much cultivated in Upper India and to a certain extent in GOALPARA, KAMRUP and DARRANG.

Lens esculenta Mœnch. Vern. *Masur*, Hind & Beng.

A small erect softly pubescent herb. *Leaflets* 4-6 pairs; small, sessile, lanceolate, entire, rachis ending in a bristle; stipules semi-sagittate; stipels 0. *Racemes* 2-4 fld. *Flowers* pale blue or purple. *Calyx* teeth sub-equal, linear, silky. *Corolla* a little exserted; style bearded. *Pod* compressed, about .5 in. long, rhomboid-oblong. *Seeds* compressed of the shape of double convex lens, grey with minute spots, not beaked; cotyledons red.

This useful pulse is very successfully cultivated as a cold weather crop in GOALPARA, KAMRUP and DARRANG by immigrants from NORTHERN and EASTERN BENGAL.

Lathyrus sativus Linn. Vern. *Khesari*, *Teora*, Beng. & Ass.

An annual subscandent herb with hollow winged stems. *Leaves* paripinnate, the rachis ending in a tendril or bristle; petiole winged; stipules lanceolate, entire, auricled. *Leaflets* 2 or 4, 1.2-5 by .1-5 in., lanceolate. *Calyx* campanulate; teeth long, lanceolate. *Corolla* .5-.7 in. long, bright blue or white; standard broad, finely veined; keel short. *Staminal* tube truncate. *Style* flattened at the tip, bearded. *Pod* 4-5 seeded, glabrous, compressed; dorsal suture with a narrow spreading wing on either side. *Seeds* faceted, spotted.

A useful pulse cultivated as a *rabi* crop in the BRAHMAPUTRA VALLEY up to DARRANG.

5. MILLETTIA Wt. & Arn.

Trees or shrubs, the latter usually climbing. *Leaves* imparipinnate; leaflets opposite. *Racemes* simple and axillary, often fascicled or paniced and terminal. *Calyx* campanulate, shortly toothed or truncate. *Petals* much exserted, long-clawed. *Stamens* diadelphous, but the vexillary filament is sometimes connate from the middle; anthers uniform, basifixed. *Ovary* sessile, linear, few-ovuled; style filiform, incurved, glabrous; stigma capitate. *Pod* linear or oblong, flat or turgid, few-seeded, tardily dehiscent.

I. Trees or erect shrubs; standard not auricled.

Pod usually compressed :—

Leaflets 15-21, pubescent beneath;
stamens monadelphous. Pod pube-
scent, not broad, sutures not
thickened.

1. *M. pulchra*.

- Leaflets 9-11, glabrescent beneath; stamens diadelphous. Pod with prominent warts, sutures thickened and winged. 2. *M. Prainii*.
 Leaflets 5-7, glabrescent beneath; stamens diadelphous. Pod smooth, broad, sutures not thickened. .. 3. *M. Piscidia*.
- II. Climbers; standard not auricled; pod not compressed, usually constricted between seeds when more than one seeded :—
 Leaflets 11-17, brown pubescent beneath; stipules 0; standard glabrous on the back. 4. *M. pachycarpa*.
 Leaflets 5-7, glabrescent beneath, stipellate; standard densely silky. .. 5. *M. cinerea*.
- III. Climbers; standard auricled. Pod compressed :—
 Leaflets 7-9, long caudate; stipules and stipels falling off early; pod less than 1 in. broad, thin, minutely pubescent, sutures not prominently thickened, valves not woody. 6. *M. caudata*.
 Leaflets 7-9, shortly acuminate; bases of stipules persisting and prominent on the branches; stipels persistent. Pod 1-1.5 in. broad, velvety tomentose, thickened at the sutures, valves woody. 7. *M. auriculata*.

1. *Millettia pulchra* Benth. Vern. *Dieng-shakuriao*, *Dieng-tiw-khmat*, *Taw-tynneng*, *Sa-long-teu*, Khasi.

An erect shrub or a small tree 25-30 ft. high; young parts densely rusty pubescent; branchlets glabrous, more or less sulcate, lenticelled; bark thin, dark-grey outside, dull-white inside. *Leaves* 5-9 in. long; rachis sulcate, finely adpressed pubescent; stipules ligulate, .1-.15 in. long, densely pubescent. *Leaflets* 15-21, .9-3 by .3-.8 in., narrow-elliptic or oblong, tapering acuminate, margins slightly recurved, thinly chartaceous, dark-green and glabrous above, adpressedly silky pubescent and bluish-grey beneath; lateral nerves about 7 on either half, much arched, very slender; petiolules .1-.15 in. long; stipels bristle-like, scarcely .1 in. long. *Racemes* axillary, simple, 5-8 in. long; bracts minute; flowers purple or nearly so, fascicled on slender pedicels, .1-.6 in. long. *Calyx* as long as pedicel, shortly toothed or almost truncate, adpressed pubescent outside.

Corolla about .5 in. long; standard pubescent outside along the nerves when young or glabrous, generally with a green centre, not spurred. *Ovary* silky pubescent. *Pod* 2.4 by .5-.6 in., minutely adpressed hairy, generally 2-3 seeded. *Seeds* suborbicular, .25 in. across, reddish-brown.

KHASI HILLS, 3-4,500 ft., e.g., Cherrapunji, Tyrna, Puriem, Gunner falls etc.

The wood is very tough and is fit for tool handles and agricultural implements.

Flrs. 4-6, sometimes in December.* Fr. 9-10.

The form with larger leaflets may be a separate variety but they are connected by intermediate characters with the forms with small leaflets.

2. *Millettia Prainii* Dun. Journ. Linn. Soc. Vol. XLI., 1912.

A small or middle-sized tree up to 40 ft. in height and 4.5 ft. in girth with a short trunk and spreading crown, having a tendency to be gregarious; bark dark-greenish grey and lenticelled outside both in horizontal and vertical short bar; blaze cream coloured inside, green underneath the corky layer; young parts pubescent. *Leaves* 6-10 in. long; rachis terete, glabrous; stipules minute. *Leaflets* up to 11, 2.4 by .7-1.5 in., elliptic-lanceolate or oblanceolate, tapering acuminate, oblique at the base, chartaceous, minutely adpressed silky when young, glabrescent with age, pale or subglaucous beneath; lateral nerves 7 or 8 on either side of the midrib, slender, arched; petiolules .2-.25 in. long, terete, glabrous. *Racemes* simple, axillary, 4-6 in. long; flowers generally in fascicles of two, about .5 in. long. *Calyx* about .1 in. long, deeply cup-shaped, somewhat oblique, dark-brown and slightly pubescent outside, glabrous inside; teeth minute, deltoid. *Petals* purplish-white; standard orbicular with numerous fine purple lines at the base; wings and keel of a somewhat deeper purple. *Stamens* diadelphous; filaments glabrous, shining. *Ovary* covered with dark-brown bristles; style glabrous. *Pod* 3.4 by .6-.8 in., 2-3 seeded, with prominent scattered warts; both sutures

* This may be a variety different from the type described above, but the materials at hand are insufficient to enable me to separate them.

thickened and winged. *Seeds* about .5 by .3 in., compressed, smooth, reddish or chocolate.

Found along the right bank of the Monas (Dist. GOALPARA), also along the Tura-Dalu Road in the GARO HILLS.

Wood yellowish, hard, in alternate bands of light and dark tissue, not liable to split or warp, weighing about 55 lbs. per c. ft.

Flrs. 3-4. Fr. 6-9.

3. *Millettia Piscidia* Wight. Vern. *Dieng-soh-lynthein*, Khasi; *Mohal*, Sylh.

A small or middle-sized tree in general appearance much resembling the litchi. *Bark* plain, greenish-grey to dun-brown; blaze pale granular. *Leaves* somewhat approximate at the ends of the branchlets; stipules minute, caducous. *Leaflets* 5-7, but sometimes only three; lateral generally opposite, extipellate, 2-4 by .7-1.2 in., ovate-oblong, bluntly caudate, thinly coriaceous, quite glabrous, green on both surfaces or subglaucous beneath; main lateral nerves 6-8 on either half, arched, very slender; petiolules about .15 in. long. *Racemes* simple, lax-flowered; pedicels .25-.35 in. long, capillary, ebracteate. *Calyx* membranous, thinly silky or almost glabrous. *Corolla* white, .5-.6 in. long; standard glabrous. *Stamens* diadelphous. *Pods* 3-7 by .8-1.3 in., narrowed at both ends, coriaceous, smooth but faintly reticulate at the faces, early-dehiscent, 2-4 seeded. *Seeds* laterally oblong. .7 by .5 in., with a horny smooth brown testa.

Along the southern foot of the KHASI HILLS, e.g., Tyrna, Shella, banks of the Loobah Lake, etc., generally in shady ravines.

Flrs. Rainy season. Fr. Cold weather.

4. *Millettia pachycarpa* Benth. Vern. *Bokoa-bih*, *Bokol-bih*, Ass.; *Holosi*, Ass.; (Darr.); *Mak-khal*, Garo; *Ru-gojao*, Kach.; *Arru*, Kuki, *Khariu*, Khasi.

A large climber; branches terete; shoots, rachis, petiolule and inflorescence brown velvety. *Leaves* 9-15 in. long, deciduous; stipules deltoid, early deciduous. *Leaflets* exstipellate, 11-13, 2.3-8 by 1-3 in., terminal obovate, lateral oblong-lanceolate to oblanceolate, chartaceous, abruptly acuminate, glabrous above, brown tomentose beneath; lateral

nerves 10-14 on either half, very oblique, nearly straight; base cuneate; petiolules $\cdot 15\text{--}\cdot 25$ in. long. *Racemes* 5-9 in. long, somewhat densely flowered, axillary or forming terminal panicles. *Flowers* about 1 in. long, in fascicles at the nodes, sometimes from a short peduncle; pedicels stout, $\cdot 2\text{--}\cdot 25$ in. long; bracts and bracteoles small. *Calyx* $\cdot 2\text{--}\cdot 25$ in. long, bowl-shaped, brown-tomentose; teeth minute. *Corolla* $\cdot 7\text{--}\cdot 9$ in. long, light-mauve; standard glabrous on the back, not auricled. *Stamens* monadelphous. *Pod* 4-5 in. long, 1 in. or more broad, 1-3 seeded, woody, rugose, glabrous, often indented between the seeds.

GARO and KHASI HILLS and their neighbourhood up to 4,000 ft. The roots are used to poison fish.

Flrs. 3-4.

5. *Millettia cinerea* Benth. Vern *Mei-Blei*, *Jarmeisoh-lynkai*, *Mei-khari-jendru*, Khasi; *Jermi-sna-jalong*, Synt.

A fairly large woody climber with a bushy habit; young branches pubescent; bark exuding a reddish gum. *Leaves* deciduous about a foot long; common petiole channelled, swollen at the base; stipules subulate up to $\cdot 2$ in. long. *Leaflets* generally 5, 2-5 by 1-2 in., obovate-oblong or elliptic, abruptly bluntly acuminate, membranous or chartaceous, pubescent beneath when young, soon glabrescent; lateral nerves 7-9 on either half, oblique, more or less arched; petiolules about $\cdot 15$ in. long, stout; stipels setaceous, as long as the petiolules. *Racemes* generally in terminal, silky, pubescent panicles, 4-9 in. long; flowers about $\cdot 7$ in. long; pedicels up to $\cdot 25$ in. long; bracts and bracteoles subulate, caducous. *Calyx* about $\cdot 15$ in. long, densely silky; teeth short. *Corolla* reddish, $\cdot 5\text{--}\cdot 6$ in. long, grey-silky; standard densely silky on the back, not auricled. *Stamens* diadelphous. *Ovary* densely shaggy with white hairs; style glabrous, curled upward. *Pod* conspicuously torulose, generally 1-3 seeded, but sometimes as many as 8-seeded; joints globose, about 1 in. across, velvety, specially when young.

Throughout the plains of ASSAM and up to 5000 ft. in the GARO and KHASI HILLS.

Flrs. 5. Fr. 9-12.

6. *Millettia caudata* Baker.

An erect or straggling shrub about 15 ft. high; branches thin, glabrous, sparsely lenticelled. *Leaves* 12-15 in. long; common petiole slender, glabrous. *Leaflets* 5-9, 4-9 by 1.5-2.7 in., oblong-elliptic to oblong-lanceolate or oblanceolate, long-acuminate, thinly chartaceous, glabrous and bright green above, glaucous beneath; lateral nerves about a dozen on either half, slender, arched; petiolules .2-.35 in. long; stipels minute, caducous. *Racemes* axillary, 4-6 in. long, rather lax-flowered; pedicels short. *Calyx* about .12 in. long, silky; margin wavy or indistinctly toothed. *Corolla* .3-.4 in. long, densely silky; standard auricled. *Stamens* 2-adelphous. *Pod* 3-5 by .6-.75 in., straight, rigidly coriaceous or semi-woody, minutely adpressed pubescent, dehiscent, obliquely jointed, 3-5 seeded.

KHASI HILLS up to 3,000 ft.; also plains of SYLHET and UPPER ASSAM (down to Tezpur).

Flrs. 5-7. Fr. 12-3.

7. *Millettia auriculata* Baker. Vern. *Hololokha*, *Bologlokha*, Mech; *Gurari*, *Gauj*, Hind.

A woody climber distinctly gregarious in habit; young shoots fleshy, finely silky-tomentose. *Leaves* 1-2 ft. long, crowded at the ends of branchlets; common petiole terete, swollen at the base; stipules large, silky outside, basal portion usually persistent and prominent on the branches. *Leaflets* 7-9, 3-8 by 2-4 in., obovate-oblong or elliptic, bluntly and often abruptly acuminate, chartaceous, densely grey silky when young, afterwards glabrescent and green above, pale and minutely pubescent beneath; lateral nerves 10-14 on either half, oblique, nearly straight; base cuneate or rounded; lateral petiolules .2 in. long; stipels minute, setaceous. *Racemes* axillary, always simple, 4-9 in. long. *Flowers* dull-white, shortly pedicelled, fascicled on the rachis. *Calyx* .1-.12 in. long, broadly campanulate, shortly toothed, densely brown silky. *Corolla* about .3 in. long, silky all over; standard auricled. *Stamens* monadelphous; the tube being slightly split in front. *Style* filiform, glabrous, incurved; ovary hairy. *Pod* 4-7 by 1-1.5 in., straight,

strap-shaped and hard, permanently brown velvety, with very thick sutures, tardily dehiscent, 2-4 seeded.

In nearly all sal areas in the PROVINCE, chiefly in grassy blanks. Very common in the drier parts of the GOALPARA Sal forests.*

The leaves are used as fodder and the root to kill fish.

Flrs. 4-6. Fr. 11-2.

Millettia fruticosa Benth. Closely resembles the last species, differing by having more numerous (9-11) leaflets, subsessile reddish flowers in shorter axillary racemes and also in terminal panicles and nearly glabrous mature pods.

Said to occur in Assam, but no specimens are available.

Wisteria chinensis Sieb & Zucc.

A large climbing shrub; bark darkish brown. *Leaves* alternate, paripinnate, 5-6 in. long. *Leaflets* ovate, acuminate, entire; nerves hairy. *Flowers* bluish, about .9 in. long, in 5-7 in. long villous terminal racemes from the ends of branchlets; pedicels about .9 in. long, hairy. *Calyx* distinctly lobed; lobes often acute. *Pods* thin, coriaceous, dehiscent (Brandis).

KHASI & JAINTIA HILLS (No. 9906) Shillong 5000 ft.

Flrs. 3.

6. TEPHROSIA Pers.

Herbs or undershrubs. *Leaves* imparipinnate; stipules setaceous, usually persistent. *Leaflets* few or many, opposite, usually obliquely parallel nerved; stipels 0 or minute. *Racemes* leaf-opposed or terminal or flowers axillary, solitary or in pairs. *Calyx* campanulate; teeth distinct. *Petals* clawed; standard suborbicular; wings slightly adnate to the incurved (but not beaked) keel. *Stamens* diadelphous; anthers obtuse. *Ovary* sessile, many-ovuled; style incurved, filiform or flattened, glabrous or villous; stigma often penicillate. *Pod* flattened, continuous or more or less septate between the seeds. *Seeds* ovate; strophiole 0 or small.

Shrub 6-10 ft. high. Branches angled or grooved. Leaflets 1.5-2.5 in. long, ligulate, acute. Flowers large, white.

1. *T. candida*.

Perennial herb, 1-2 ft. high. Branches terete.

Leaflets hardly 1 in. long, obovate, obtuse.

Flowers small, purplish.

2. *T. purpurea*.

* It is sometimes reduced to a semierect shrub in the dense shade of the forest.

1. *Tephrosia candida* DC. Vern. *Bilakshani* or *Bilokhoni*, Ass.; *Bangali-dadigdiga*, Ass. (Kam.); *Mith-phang*, Cach.; *Samendu*, *Bolmendu*, Garo; *Dieng-toh*, Khasi; *Nathri*, Jharua; *Balasar*, Mech.; *Bangara*, Beng. (Sylh.).

A shrub 6-10 ft. high with a gregarious tendency; branches angled or grooved, densely grey-silky. *Leaves* 5-10 in. long; rachis grey-silky. *Leaflets* 15-29, 1·5-2·5 by ·3·5 in., narrowly oblong to obovate-oblong or ligulate, quite entire, minutely mucronate, subcoriaceous, dark-green and subglabrous above, pale and densely adpressed silky beneath; lateral nerves numerous, slender, oblique, straight, almost concealed by the dense silky hairs beneath; base acute; stipules ·2·25 in. long, deltoid-acuminate, hairy. *Racemes* simple, 6-9 in. long, terminal with often a few shorter ones from the axils of the upper leaves; rachis stout, angled or sulcate. *Flowers* creamy-white in fascicles of 2-4; pedicels ·3·8 in. long, filiform, silky, slightly thickening in fruit. *Calyx* ·15·2 in. long, broadly campanulate, somewhat oblique; teeth short, unequal, silky. *Corolla* ·7·1 in. long; standard obovate, densely silky outside. *Style* flattened, silky. *Pod* 3-4 by ·3 in., 10-12 seeded, continuous, densely covered with adpressed brown silky hairs, usually tipped with persistent style. *Seeds* brownish, transversely oblong, compressed, ·15 by ·12 in., with a white strophiole.

Throughout the province, generally in low lying grass-lands ascending to 3,000 ft. in the MIKIR, GARO and KHASI HILLS.

Often grown in tea-gardens as a fertiliser in newly planted plots, and also as a nurse for seedlings in forest plantations and in gardens for ornament.

Flrs. 8-10. Fr. 11-12.

2. *Tephrosia purpurea* Pers. Vern.; *Ban-nil*, Beng.; *Saraphunka*, Sans.

A suberect diffuse perennial; branchlets terete, glabrescent, often more or less zigzag; young parts silky. *Leaves* 2-6 in. long; stipules filiform, subulate, generally ascending. *Leaflets* 7-21, ·3·1 by ·1·6 in., obovate, rounded or emarginate, shortly mucronate, cuneate at the base, glabrescent above, adpressedly hairy beneath; lateral nerves very oblique, slender, straight, purplish. *Racemes* 3-6 in. long, lax-flowered, often leaf-opposed; bracts 3-furcate, setaceous.

Calyx .1-.15 in. long, strigose outside, with sharp-pointed teeth. *Corolla* .25-.3 in. long, purple; standard .15 in. broad. *Style* flattened, subglabrous. *Pod* 1-1.5 by .15 in., straight, thinly pubescent, 4-6 (10?) seeded. *Seeds* greenish-grey, smooth, speckled.

Fairly common in dry grass-lands and road-sides.

Flrs. Rainy season. Fr. 12-1.

Robinia pseud-acacia Linn.

A tree; young parts pubescent. *Leaves* imparipinnate; leaflets usually 6 pairs, elliptic, membranous, obtuse. *Flowers* in axillary racemes.

N. American species. Cultivated in Lake Garden Shillong, 4,500 ft.

Flrs. 4.

7. SESBANIA Pers.

Sesbania ægyptiaca Pers. Vern.; *Jayanti*, Sans.; Beng., and Ass.

A quick-growing soft-wooded short-lived shrub, 10-15 ft. high with short terete branches. *Leaves* paripinnate, 3-6 in. long; stipules lanceolate, deciduous. *Leaflets* 8-20 pairs, .6-1 by .1-.2 in., linear-oblong, membranous, glabrous, pale-green, minutely petioluled. *Racemes* axillary, 3-6 in. long, 6-10 flowered; pedicels .15-.2 in. long. *Calyx* .2 in. long, campanulate, membranous, glabrous, short-toothed. *Petals* subequal, long-clawed, pale-yellow or standard often with purple spots, maroon or deep purple. *Stamens* 2-adelphous. *Ovary* stalked, many-ovuled; style filiform, incurved, glabrous. *Pod* 6-9 in. long by .15 in. across, torulose, flexible, twisted, 20-30 seeded, dehiscent, septate between the seeds.

Cultivated as a fertilizer and for shelter in young plantations, sometimes found wild as escapes.

The leaves are used as poultices over rheumatic and other swellings. An ointment prepared from the seeds is used for itches and other skin diseases. The fibre of the bark is used for ropes and the leaves and tender branches for cattle-fodder.

Flrs. 8-9. Fr. Cold season.

8. LESPEDEZA Mich.

Herbs or undershrubs. *Leaves* pinnately 3-foliate, stipulate; leaflets without stipels. *Flowers* axillary, fascicled

or racemed. *Calyx-tube* campanulate; teeth long. *Corolla* exserted; standard broad. *Stamens* diadelphous (9+1). *Ovary* sessile or stipitate, 1-ovuled; style long, incurved, often persistent; stigma minute. *Pod* small, oblong, compressed, indehiscent, 1-seeded, reticulately veined.

Leaflets thinly grey pubescent beneath :—

Keel obtuse, not much incurved. Petiole 1.1-5 in. long. Leaflets up to 2 in. in length. Pod .25 in. long, downy. ..

1. *L. elliptica*.

Keel acute, much incurved. Leaflets generally below 1 in. in length :—

Petiole not exceeding .7 in. in length.

Pod about .5 in. long with dense spreading hairs.

2. *L. stenocarpa*.

Petiole up to .25 in. long, densely pubescent.

3. *L. eriocarpa*.

Leaflets silvery, canescent beneath, up to 2 in. in length. Keel acute and incurved. Pod scarcely .25 in. long, glabrescent. ..

4. *L. Thomsoni*.

1. *Lespedeza elliptica* Benth.

A shrub 6-10 ft. high; branches obscurely sulcate, finely grey-pubescent. *Leaves* 2-4 in. long; petiole 1.1-7 in. long, slender, pubescent. *Leaflets* .7-2.2 by .4-1.2 in., obovate-cuneate, obtuse, subcoriaceous, green and minutely canescent above when young, afterwards glabrescent, grey and more or less densely adpressed pubescent beneath; midrib shaggy beneath; petiolules .1-2 in. long. *Racemes* 1.5-4 in. long, peduncled; rachis and the short pedicels hairy; bracts and bracteoles ovate-lanceolate, .05-.1 in. long, hairy. *Calyx* .2-.25 in. long, grey-canescant; teeth linear, twice as long as the tube. *Corolla* deep red, .3-.4 in. long. *Pod* about .25 in. long, oblong, stalked, downy.

KHASI HILLS. Fairly common in the neighbourhood of Myrong such as Nongbri, Byntar, etc.

Flrs. 9-10. Fr. 12-1.

2. *Lespedeza stenocarpa* Maxim. Syn. *L. macrostyla* Baker (in part).

An undershrub 3-5 ft. high with densely grey-pubescent branches. *Leaves* .7-1.5 in. long; petiole .5-.7 in. long. *Leaflets* .5-.8 by .4-.6 in., obovate-cuneate, often emarginate,

rigidly subcoriaceous, glabrescent and rather strongly veined above, generally persistently white-silky beneath. *Racemes* short, dense-flowered, silky; buds hidden by silky bracts; pedicels $\cdot 1\cdot 2$ in. long. *Calyx* about $\cdot 1$ in. long; teeth longer than the tube. *Corolla* $\cdot 4\cdot 6$ in. long, deep rose; keel acute, much incurved. *Pod* about 1 in. long, shortly stalked, narrow-oblong, gradually tapering to the base of the persistent hairy style.

Up to 3000 ft. in the KHASI HILLS and possibly the MIKIR and other hills.

Flrs. 8-9. Fr. 12-2.

3. *Lespedeza eriocarpa* DC.

A much-branched undershrub 3-5 ft. high; branches slender, angular, furrowed, silky. *Leaves* $\cdot 5\cdot 2\cdot 5$ in. long, gradually smaller towards the extremities of the branches; petiole $\cdot 1\cdot 1$ in. long, channelled, adpressed silky; stipules $\cdot 1\cdot 3$ in. long. *Leaflets* $\cdot 2\cdot 1\cdot 2$ by $\cdot 07\cdot 7$ in., obovate-cuneate, mucronate, subcoriaceous, glabrous and strongly veined above, grey canescent beneath; petiolules short, densely adpressed pubescent. *Racemes* 2-3 in. long, peduncled, rather lax; pedicels $\cdot 15\cdot 3$ in. long, very slender, pubescent; bracts setaceous. *Calyx* $\cdot 2$ in. long, densely hairy; teeth linear, about twice as long as the tube. *Corolla* rosy-red, $\cdot 4\cdot 5$ in. long; keel incurved. *Pod* about $\cdot 25$ in. long, densely pubescent, shortly stalked; style pubescent at the base.

Grass-lands in the KHASI HILLS, 5-6000 ft.

Flrs. 9-11. Fr. 12-2.

4. *Lespedeza Thomsoni* Benth. Vern. *Ja Langkrem, Dieng-lalih*, Khasi.

A shrub up to 10 ft. in height; branches sulcate, silky. *Leaves* $\cdot 5\cdot 4$ in. long, gradually smaller towards the ends of the branches; petiole 1-2 in. long, angled or somewhat flattened, white canescent; stipules $\cdot 15\cdot 2$ in. long, subulate. *Leaflets* $\cdot 4\cdot 2$ by $\cdot 1\cdot 1$ in., oblong or elliptic, mucronate, subcoriaceous, dark-green, glabrous and elegantly veined above, densely silvery canescent beneath; petiolules short. *Racemes* 1-4 in. long, peduncled, congested, crowded at the extremities

of the branches to form false terminal panicles; pedicels .3-.5 in. long, slender, pubescent; bracts slightly longer than the pedicels, linear, terminating in a long bristle. *Calyx* .1-.15 in. long, obconic; teeth lanceolate, as long as the tube. *Corolla* deep purple, fading to bright rosy, .3-.35 in. long, subsessile, obovate or suborbicular, compressed, delicately veined, glabrescent; valves subcoriaceous; style beardless.

KHASI HILLS, 5-6000 ft., common round Shillong; also Sohiong, Nongbri, etc.

Flrs. 8-9. Fr. 10-11.

9. SMITHIA Ait.

Herbs or undershrubs. *Leaves* usually paripinnate, the rachis then ending in a bristle; stipules scarious, persistent, generally appendaged. *Leaflets* small, sensitive, exstipellate. *Flowers* yellow, rarely bluish, generally in simple or compound racemes which are often unilateral; bracts and bracteoles scarious, persistent. *Calyx* deeply 2-lipped, the lower lip usually lobed. *Corolla* exserted; standard suborbicular with a cuneate base; wings clawed and auricled; keel-petals obtuse, incurved, clawed. *Stamens* diadelphous in two bundles of 5 each. *Ovary* many ovuled; style filiform. *Pod* of 1-seeded, orbicular, joints folded together inside the calyx. *Seeds* reniform, without a strophiole.

Racemes not paniced. Calyx rigid with simple parallel veins :—

Leaflets 2-10 pairs, bristly only along the midrib; pod 4-6 jointed. 1. *S. sensitiva*.

Racemes paniced. Calyx membranous with reticulate veins :—

Leaflets 10-12 pairs, without bristles; pod 20-25 jointed. 2. *S. grandis*.

1. *Smithia sensitiva* Ait.

A much branched semi-woody weedy plant about 2 ft. high; stem not bristly. *Leaves* .3-1 in. long; rachis bristly. *Leaflets* generally 4-12, rarely up to 20, .15-4 in. long, linear, ciliated with bristles, mainly along the midrib below. *Racemes* axillary, simple, peduncled; pedicels short, ascending. *Calyx* .25-.3 in. long; lips about equal, acute, entire, with a

few short deciduous scattered bristles; nerves parallel, close. *Corolla* bright-yellow with a brown band in the throat. *Pod* of 4-6 joints, densely papillose on the faces.

KHASI HILLS up to 3000 ft., generally in grass-lands.

Flrs. and Fr. 10-11.

***S. ciliata* Royle.**

An annual herb with much-branched slender stems up to 2 ft. in height. *Leaves* 5-1 in. long. *Leaflets* 6-16, 2-3 in. long, linear, strongly bristly along the midrib below and bristly-ciliate along the margins. *Racemes* axillary, simple, short-peduncled, secund; bracteoles leafy, ciliate. *Calyx* 25 in. long, reticulate-venose, densely bristly-ciliate; upper lip truncate. *Corolla* yellow, (bluish-white, Haines), little exserted. *Pod* of 6-8 joints, obscurely papillose.

KHASI HILLS up to 6000 ft. in grass-lands.

Flrs. and Fr. 9-10.

2. *Smithia grandis* Benth. Vern.; *Alkhani*, Ass.; (Darr.).

Stems stout, 6-8 ft. high, finely sulcate, glabrous, without bristles. *Leaves* 3-4.5 in. long; rachis glabrous or with a few bristles near the base; stipules fixed by the middle, persistent; upper portion about 1 in. long, oblong-lanceolate, glabrous; lower 25-3 in. long. *Leaflets* 20-24, 5-6 by 1-1.5 in., subsessile, linear-oblong, cuspidate, firmly subcoriaceous, glabrous; lateral nerves invisible. *Racemes* subsecund, forming terminal panicles, 5-8 in. long; pedicels 5-6 in. long, rigid, ascending with few scattered subdeciduous bristles near the top; bracteoles 2 to each flower, 25-35 in. long, persistent, glabrous. *Calyx* 4-5 in. long, persistent and enlarged in fruit to 8 in., lips divided nearly down to the base, each lip undivided, broadly obovate, obscurely crenulate-serrate at the tips, strongly reticulate veined and with few bristles on the back near the apex. *Corolla* much exserted, 1-2 in. long, yellow with dark veins. *Pod* of 20-25 joints; joints suborbicular, about 15 in. across, conspicuously veined.

Sub-Himalayan Tracts from Dikrain in LAKHIMPUR westward to near Kachugaon in GOALPARA, in grass-lands or edges of swamps.

Flrs. 3-4. Fr. 1-2.

S. blanda Wall. Vern. *Bat-shakuriao*, Synt.

A perennial suffruticose herb 2-4 ft. high; stems clothed with fine yellow bristles. *Leaves* about 1 in. long; rachis bristly; stipules fixed by the middle, persistent, .5-.7 in. long, linear lanceolate with a long cusp at both ends, with scattered bristles outside. *Leaflets* 6-10, .4-.17 by .15-.2 in., subsessile, oblong, cuneate or rounded at the base, membranous but firm, with bristles along the edges and midrib. *Racemes* paniced, terminal; pedicels .1-.15 in. long, bristly; bracteoles about .12 in. long, bristly. *Calyx* about .25 in. long, densely bristly outside, the lower lip 3-lobed. *Corolla* bright yellow, about .5 in. long. *Pod* of 5-6 joints, each about .1 in. across, dark brown, reticulated.

KHASI and JAINTIA HILLS, 4-6000 ft., common in water-logged places and edges of swamps.

Flrs. and Fr. 9-11.

10. ÆSCHYNOMENE Linn.

Erect herbs or undershrubs. *Leaves* imparipinnate; stipules lanceolate or setaceous, deciduous, sometimes auricled. *Leaflets* very numerous, linear, sensitive, without stipels. *Flowers* yellow, generally in lax axillary racemes, each supported by a couple of bracteoles at the base of the calyx and a bract resembling the stipules at the base of the pedicel. *Calyx* deeply 2-lipped, the lips entire or faintly toothed. *Corolla* exserted, fugacious; standard orbicular; wings transversely barred; keel not beaked. *Stamens* in two bundles of 5 each. *Ovary* stalked, many ovuled. *Pod* long-stalked of 4-8 one-seeded separating joints. *Seeds* without a strophiole.

Stems slender. Flowers about .4 in. long.

Upper suture of pod straight or nearly so. .. 1. *Æ. indica*.

Stems stout. Flowers about .75 in. long.

Upper suture of pod indented like the lower. .. 2. *Æ. aspera*.

1. Æschynomene indica Linn. Vern.; *Kuhila*, Ass.; (Sibs.).

An erect slender much-branched annual, 1-3 ft. high; branchlets terete, finely striate and scabrid with minute warts. *Leaves* 1.5-3 in. long; stipules .2 in. long, membranous, auricled, ciliate-toothed. *Leaflets* 41-61, .08-.1 by .02 in., close, oblong, mucronate, 1-nerved. *Racemes* axillary, appearing terminal after the leaves are shed, often branched, viscid; bracts and bracteoles deciduous, often gland-ciliate;

pedicels .25-.35 in. long. *Calyx* about .2 in. long, membranous, glabrous. *Corolla* yellow, about twice as long as the calyx. *Pod* of 5-10 joints, 1-1.7 by .15-.2 in., papillose on the faces, on stalks .25-.35 in. long; lower suture indented.

Fairly common in wet grass-lands in the plains and up to 4,000 ft. in the hills.

Flrs. 9-10. Fr. 10-12.

2. *Æschynomene aspera* Linn. Vern. *Sola*, Beng.

A little-branched stout herb up to 12 ft. in height, the stems attaining a diam. of about 2 in.; bark greenish-grey, warty, deeper-green underneath the cuticle. *Leaves* 3-6 in. long; stipules auricled, deciduous. *Leaflets* 61-101, .3-.6 by .1-.2 in., oblong or linear, 1-nerved. *Racemes* 1.5-3 in. long, lax-flowered and often branched, clothed with bristly hairs; pedicels .1-.15 in. long, hairy. *Calyx* .3-.4 in. long, hispid, supported by a pair of hairy bracteoles. *Corolla* .6-.7 in. long, yellow, hispid. *Pod* 1.5-3 by .3 in., of 3-6 joints, each .4 in. long, indented along both sutures, echinate over the seeds.

In swamps and jheels especially in the SURMA VALLEY.

The wood is white, pith like, soft and very light. It is made into hats, toys and decorative flowers. The stems are tied together in bundles and used as rafts.

Flrs. 4-9. Fr. 10-11.

***Pycnospora hedysaroides* R. Br.**—A perennial herb with trailing caespitose stems up to 2 ft. in length. *Leaves* pinnately 3-foliolate; petiole flattened, sparsely ciliate; stipules free, scarious, striate. *Leaflets* stipellate, .3-1.5 in. long, obovate, pale and reticulately veined beneath. *Flowers* small, in slender terminal or axillary racemes; pedicels downy; bracts deciduous, membranous; bracteoles 0. *Calyx* about .08 in. long, deeply cleft. *Corolla* purplish, exserted. *Stamens* diadelphous (9+1). *Ovary* sessile, many-ovuled; style slender, inflexed. *Pod* about .5 in. long, turgid, 6-10 seeded, continuous, transversely veined, black when mature. *Seeds* small, minutely strophiolate.

Common in grass-lands and meadow in the KHASI HILLS above 3000 ft.

11. URARIA Desv.

Perennial herbs or undershrubs. *Leaves* 1-foliolate or pinnately 3-9 foliolate; stipules scarious, striate; stipels

subulate. *Flowers* small, purple or yellow in simple or compound often elongated terminal racemes; bracts resembling stipules; bracteoles 0. *Calyx* tube very short; limb 2-lipped; the three lower teeth elongated, setaceous. *Corolla* small; standard broad, clawed; wings falcate, adherent to the obtuse keel. *Stamens* diadelphous; style filiform, inflexed. *Pod* of 2-6, small, 1-seeded, indehiscent joints, often folded face to face. *Seeds* orbicular or globose without a strophiole.

- | | | |
|------|---|---|
| I. | Upper leaves 5-9 foliolate. Leaflets linear, variegated. Racemes terminal, simple, dense, up to .7 in. across. | 1. <i>U. picta</i> . |
| II. | Upper leaves 3-7 foliolate. Leaflets oblong, generally not variegated. Racemes terminal, simple, dense, up to 1.5 in. across. | 2. <i>U. crinita</i> . |
| III. | Upper leaves 1-3 foliolate. Leaflets oblong or elliptic :—
Racemes terminal and axillary, simple, dense, lower calyx teeth much longer.
Racemes terminal, paniced, lax; calyx teeth subequal. | 3. <i>U. alopecuroides</i> .
4. <i>U. hamosa</i> . |
| IV. | Usually all leaves 1-foliate. Leaflets oblong-lanceolate. Racemes terminal, simple, dense. | 5. <i>U. prunellæfolia</i> . |

1. *Uraria picta* Desv.

A little-branched erect undershrub, 3-6 ft. high; stems terete, finely downy. *Leaves* very variable; the lowermost simple, small, orbicular, followed by 3-5-7-9-foliate leaves with linear leaflets mixed with a few 1-foliate ones; common petiole 3-4.5 in. long, downy; stipules up to .9 in. long, obliquely ovate or lanceolate, sharply long acuminate. *Leaflets* 3-7 by .3-1 in., linear, rigidly subcoriaceous, glabrous and variegated with irregular greyish blotches along the midrib above, harshly pubescent and strongly net-veined beneath, minutely mucronate, generally rounded at the base; lateral nerves about 10 on either half, very oblique; petiolules very short, downy; stipels subulate, longer than the petiolules. *Racemes* terminal, simple, very dense and hairy, 3-10 in. long and .5-.7 in. across; bracts scariosse, deciduous, gradually narrower upward; pedicels .2-.25 in. long, abruptly incurved at the tip after flowering, clothed with

bristles. *Calyx* deeply divided; lobes subulate, feathery with spreading bulb based hairs. *Corolla* purple, exserted. *Pod* of 3-6 polished joints.

In drier grass-lands in the plains of LOWER ASSAM and up to 4000 ft. in the HILLS.

Flrs. 6-9. Fr. 9-10.

2. *Uraria crinita* Desv. Vern. *Dieng-kha-riu*, Khasi.

A shrub 3-6 ft. high; stems stout, striate, strigose with hooked hairs when young. *Leaves* 6-10 in. long; common petiole ribbed; stipules .4-.6 in. long, broadly subulate, striate, rusty-shaggy. *Leaflets* 3-7, 2-5 by 1-2 in., oblong, acute or subacute at the apex, minutely mucronate, generally rounded at the base, coriaceous, smooth, glabrous and usually without blotches above, strongly net-veined and pubescent along the nervules beneath; lateral nerves generally 10 on either half, arched. *Racemes* terminal, simple, 2-14 in. long and .8-1.5 in. across, very hairy; pedicels .5-.6 in. long, shaggy with spreading brown bristles; bracts densely ciliate. *Calyx* shaggy; segments plumose with spreading hairs. *Corolla* .3-.4 in. long, purple, delicately veined. *Pod* of 4-6 opaque joints.

Appears to be confined to the KHASI HILLS up to 4,000 ft., generally in open grass-lands.

The roots are used to intoxicate or kill fish.

Flrs. 10-11. Fr. 12-2.

3. *Uraria alopecuroides* Wight. Syn. *U. lagopus* F. B. I. Vern. *Dieng-soh-mulh*, *Jermei-soh-phlang*, Khasi.

An undershrub 3-4 ft. high with dark-brown woody root stock and somewhat hispid stems; young parts pubescent. *Leaves* 4-7 in. long; rachis pubescent; stipules .3-.4 in. long, broadly deltoid-subulate, hairy; stipels subulate. *Leaflets* generally 3, sometimes solitary, 2-4 by 1-2 in., terminal largest, oblong to ovate-elliptic; apex obtuse, rounded or slightly emarginate, shortly mucronate, rounded or very slightly cordate at the base, chartaceous, green and hispid with scattered hairs above, pale and softly pubescent chiefly along the nerves and nervules beneath, often very lightly

variegated along the midrib; lateral nerves 8-12 on either half, slightly arched, tertiaries not so strong as in the last two species; petiolules very short, stout, shaggy with rusty hairs. *Racemes* generally terminal, 3-9 in. long and 1-1.3 in. across, not so dense as in the two foregoing species; pedicels .5 in. long, densely crinate, up-turned at the apex after flowering; bracts up to .35 in., obliquely suborbicular ovate to lanceolate, acuminate, ending in a sharp point, striate hairy outside, margins ciliate, imbricating and conspicuous in bud, early deciduous. *Calyx* .15-.2 in. long, almost concealed in dense spreading hairs; lower teeth much longer than upper. *Corolla* .2 in. long, deeply purple. *Pod* of 2-8 blackish or greyish joints, about .1 in. diam.

The hairs of this plant and possibly to some extent of the other species also, exude beads of saltish sap.

KHASI HILLS and the plains of LOWER ASSAM, chiefly in grass-lands and forest glades.

Flrs. 9-10. Fr. 11-12.

4. *Uraria hamosa* Wall. Vern. *Salpan*, Beng.

An undershrub 3-5 ft. high resembling some species of *Desmodium*; young branches pubescent; hairs both straight and hooked. *Leaves* 1-or 3-foliolate; stipules setaceous. *Leaflets* 2-6 by 1-3 in.; lateral much smaller than the terminal, oblong elliptic or ovate-lanceolate, chartaceous, rounded or slightly cordate at the base, tapering to the obtuse apex, green and glabrescent above, fulvous hairy on the nerves beneath; lateral nerves 10-18 on either half, sub-parallel; stipels setaceous. *Racemes* paniced, 6-12 in. long, glandular pubescent and hairy, covered when young with imbricating ovate cuspidate, ciliate, bracts which are adpressed silky outside and caducous before flowers open and about .45 in. in length; pedicels up-turned in fruit, 1-3 together, often in pairs. *Calyx* .1-.12 in. long, hairy; teeth subequal, longer than the tube. *Corolla* .2-.35 in. long. *Pod* of 4-8 brown, puberulous joints.

In grassy ravines in sal areas.

The decoction of the leaves in combination with some other drugs is used as a febrifuge.

Flrs. 8-10. Fr. 10-12.

U. neglecta Prain. (U. Lagopus F. B. I. II. 156 partly, not of DC.)

An erect herb, rather shrubby rusty, usually bifoliate. *Leaflets* oblong, 1-2 in. by .6-1 in., short petiolate or sessile; lateral nerves distinct, 7-11 on either half. *Heads* densely flowered, cylindric; bracts pubescent, deciduous; joints of pod shining, pale, quite glabrous.

Probably occurs in the similar localities to that of *Uraria hamosa*; Aka Hills (No. 15316).

U. clarkei Gagnep. incl. *U. Lacei Craib*.

A shrub about 4 ft. high with ferruginous, hairy, more or less sulcate stems. *Leaves* pinnately 3-foliate; common petiole .75-1.4 in. long, hairy, channelled above; stipules about .4 in. long, subulate, filiform; leaflets 4-5 by 1.5-2 in., terminal largest, ovate-lanceolate, obtuse, mucronate at the apex, chartaceous, sinuate, adpressed pubescent with somewhat harsh hairs above, pilose beneath, specially on the nerves; lateral nerves 10-13 on either side of midrib; petiolules short. *Flowers* in terminal ferruginous panicles up to 14 in. long; bracts densely imbricate, caducous, ovate acuminate, about .25 in. long. *Calyx* about .15 in. long; lobes lanceolate, acute, two upper short. *Standard* .25 in. long; wings slightly shorter than the keel, which is about .3 in. long. *Pod* upto 6 jointed, glabrescent with age.

NAGA HILLS,—Meebold! Kohima.—C. B. Clarke (No. 40924E).

Flrs. 10-11. Fr. 12.

5. Uraria prunellæfolia Grah. Vern. *Mirong-rondai*, Mech.

An undershrub scarcely exceeding 2 ft. in height with a woody root stock; branches slender, hairy when young; tap root fusiform, orange-yellow. *Leaves* 1-foliate; petiole .1-.6 in. long; stipules upto .5 in. long, triangular, acuminate, striate. *Leaflets* 2-6 by .5-3 in., oblong or lanceolate, obtuse or acute, generally rounded at the base, chartaceous, glabrous or glabrescent above, somewhat harshly pubescent along the nerves beneath; margins ciliate; lateral nerves 10-12 on either half, obliquely arched; tertiaries prominently reticulate. *Racemes* terminal, rarely lateral, simple, 1-3 by .6-.8 in., somewhat lax, densely covered with short hairs. *Flowers* in fascicles of 2-3, bluish purple; pedicels .3-.5 in. long, covered with short hooked and spreading bulb-based hairs; bracts acuminate, ciliate. *Calyx* about .15 in. long, hairy; lower teeth much longer than the upper. *Corolla* bluish purple, about .2 in. long. *Joints* of pod 3-6, spirally coiled, sparsely hairy.

In grass-lands in GOALPARA and perhaps throughout LOWER ASSAM.

Macerated green roots mixed with unboiled milk are given with good results in black water fever (G. N. Simeon).

Flrs. 9-10. Fr. 10-12.

Alysicarpus Wallichii W. & A.

A diffuse herb, almost glabrous. *Leaves* 1-foliolate. *Leaflets* about 1 in. (1.3 in. Hook). *Flowers* small in terminal racemes. *Pod* turgid, moniliform.

Aka Hills. (15317).

12. DESMODIUM Desv.

Herbs or shrubs. *Leaves* pinnately 3-foliolate or 1-foliolate; stipules free. *Leaflets* stipellate. *Flowers* small, usually in axillary or terminal racemes, less often in axillary umbels or fascicles. *Calyx* campanulate or turbinate, the two upper teeth often subconnate. *Corolla* exserted; standard obovate or orbicular; wings obliquely oblong, more or less adhering to the keel; the petals of which are obtuse, sometimes spurred. *Stamens* usually diadelphous (9+1); upper stamen entirely or partially free; anthers uniform. *Ovary* sessile or stalked, few or many-ovuled; style incurved; stigma capitate. *Pod* of several 1-seeded usually indehiscent joints, rarely joints dehiscent along one suture or pod dehiscing as a whole along the lower suture. *Seeds* compressed, reniform, without a strophiole.

ARTIFICIAL KEY.

Pods distinctly jointed; joints articulate not continuous, 1-seeded :—

A. Leaves 3 foliolate :—

1. Flowers umbelled :—

Bracts minute, deciduous. Pod of 4-5 joints; branchlets triquetrous, densely grey silky.

1. *D. Cephalotes.*

Bracts large, foliaceous, persistent, hiding the umbels. Pod usually 2 jointed; branchlets terete, finely grey downy.

2. *D. pulchellum.*

2. Flowers racemed :—

Joints of pod indehiscent :—

i. Pods 6-12 jointed :—

- * Joints of pod with hooked hairs :—
- + Leaflets not sinuate; joints of pod about twice as long as broad :—
- Leaflets shining above; pods pendulous, 2-3 in. long, joints 6-10. .. 3. *D. laburnifolium*.
- Leaflets not shining above; pods not pendulous, usually 1-1.5 in. long; joints 6-10. .. 4. *D. laxiflorum*.
- ++ Leaflets sinuate at least on the upper half, joints of pod slightly longer than broad or length and breadth nearly equal :—
- Branchlets densely pubescent; pod .5-.8 in. long, joints 6-8; racemes 2-3 in. long. .. 5. *D. sequax*.
- Branchlets puberulous; pod 1-1.5 in. long; joints 8-12; racemes 4-6 in. long. .. 6. *D. sinuatum*.
- ** Joints of pod appressed pubescent or glabrescent :—
- Pod glabrescent, 1-2 in. long, upper suture straight, indented on lower suture; joints 8-10; branchlets terete, glabrescent; leaflets minutely adpressed pubescent beneath. .. 7. *D. racemosum*.
- Pod densely adpressed pubescent, .8-1.2 in. long, indented on both sutures, more deeply on the lower, joints 6-8; branchlets angled, densely pubescent along the angles; leaflets densely grey silky beneath. .. 8. *D. sambuense*.
- ii. Pods 3-6 jointed, upper upto twice as long as broad :—
- Branchlets angled; stipules .15-.2 in. long; leaflets cuspidate acuminate; pod 1-1.8 in. long, 3-6 (rarely upto 8) jointed, joints glabrescent. .. 9. *D. khasianum*.

Branchlets terete; stipules
·3·5 in. long; leaflets round-
ed at both ends; pod 1 in.
or less, joints 4-6, minutely
downy.

- iii. Pods 1-4 jointed, joints 2-3
times as long as broad :—

* Lowest joint of pod stalked,
pod under 1 in. long, joints
1-3, more or less crescent or
scimitar shaped, constrictions
reaching from lower to upper
suture or near its racemes
lax :—

Pod 1-2 jointed; stalk
about ·3 in. long; corolla
small, ·12 in. long; stipules
small, subulate, deciduous;
bracts minute, linear; pedi-
cels ·2 in. long.

10. *D. concinnum.*

Pod 1-3 jointed, stalk short
about ·1 in.; corolla large
·2·4 in. long; stipules
·25·4 in. long, lanceolate,
persistent; bracts ·15·2
in. long, ovate-lanceolate;
pedicels ·2·1·5 in. long.

11. *D. laxum.*

** Lowest joint of pod not
stalked; pod over 1 in. long,
joints more or less straight;
constrictions reaching half or
a little more to the upper
suture; racemes dense :—

Pod 3-4 jointed; corolla
large; pedicels up to
·25 in. long.

12. *D. Scalpe.*

Joints of pod more or less dehiscent
along the lower suture :—

Joints 5-8, slightly broader than
long or length and breadth equal,
reticulate, with hooked hairs
along the sutures.

13. *D. confertum.*

14. *D. polycarpum.*

B. Leaves 1 foliolate :—

1. Petiole not winged :—

- a. Joints of pod twice or more as long
as broad :—

Pods pendulous, 6-8 jointed;
branches 3-quetrous.

15. *D. ormocarpoides.*

- b. Joints of pod less than twice as
long as broad :—

Branchlets slightly angled; grey downy leaflet ovate or lanceolate, entire, glabrescent above, joints of pod 6-10, slightly longer than broad.

16. *D. gangeticum*.

Branchlets terete, brown pubescent; leaflet broadly ovate or deltoid, more or less repand, hispid on the upper surface, joints of pod 3-6, slightly longer than broad.

17. *D. latifolium*.

Branchlets terete, rounded, glabrescent, joints of pod 3-5, as long as broad; leaflets entire, orbicular-cordate; pedicels sharply reflexed.

18. *D. retroflexum*.

2. Petiole broadly winged :—

Branchlets 3-angular; joints of pod 6-8, square.

19. *D. triquetrum*.

II. Pod indistinctly jointed, dehiscing in a continuous line along the lower suture, joints not separating :—

Leaves 1-3 foliolate; flowers comparatively large :—

Under shrub 3-5 ft. high; side leaflets if present minute; pod glabrescent.

20. *D. gyrans*.

Shrub attaining 10 ft.; side leaflets fairly well developed; pod persistently hairy.

21. *D. gyroides*.

1. *Desmodium Cephalotes* Wall. Vern. *Gohate-jhar*, *Bon-landu*,* *Makhiloti*, Ass.; *Sambraphong*, Garo; *Dangshikhop*, Mech; *Non-the*, *Non-chang-pher*, Mik.; *Samrong-thep*, Kach.; *Thing-kani*, Kuki; *Kakhang-skei*, Khasi.

A shrub 4-6 ft. high with grey bark; branches zig-zag, sharply 3-quetrous, densely grey-silky. *Leaves* 3-foliolate; petiole 1-2 in. long, deeply furrowed, grey-downy; stipules caducous, about .8 in. long, linear-lanceolate. *Leaflets* 3·5-6 by 1·5-2·5 in., terminal usually largest, oblong or elliptic, acute at both ends, subcoriaceous, green and glabrous above, densely grey-silky beneath; lateral nerves 10-20 on either half, oblique, parallel, straight, very prominent beneath. *Flowers* .3-.4 in. long in dense short

* Landu—Arahar-dal plant (*Cajanus indicus* Spreng).

peduncled axillary umbels; umbels usually solitary but sometimes on short leafless branches; peduncles upto .3 in. long; bracts caducous, hairy outside, dry, linear-oblong; bracteoles linear or setaceous; pedicels .1 in. long, short jointed at the apex. *Calyx* .15 in. long; teeth lanceolate; lower most longest. *Corolla* red, .25 in. long. *Pod* about 1 in. long, indented along both sutures, densely grey-silky; joints 4-5, about as long as broad.

Fairly common in sal areas, chiefly in glades; cattle and goats eat the leaves, but the pods are said to be poisonous for cattle.

Flrs. 7-8. Fr. 11-1.

2. *Desmodium pulchellum* Benth. Vern. *Ursi*, Ass. (Sibs.); *Takamala* (string or rupees), *Jharua*; *Jata-salpar*, Beng. & Sansk.

A shrub 4-6 ft. high; branches ribbed, grey downy, specially when young. *Leaves* 3-foliolate; rachis about 1 in. long; stipules subulate. *Lateral leaflets* 1.5-2.5 by .6-1 in., on petiolules .05-.08 in. by *terminal* 2.5-4 by 1.2-1.5 in., both elliptic-oblong or ovate-lanceolate, generally acute at the apex, more or less rounded at the base; lateral nerves 8-10 on either half, slanting, slightly arched. *Flowers* .2-.3 in. long in 2-6 flowered umbellate clusters, each being subtended by a pair of persistent, obliquely orbicular, foliaceous, strongly nerved, subcoriaceous bracts, .3-.5 in. across, placed back to back on a densely pubescent stalk ending in a long fine point, the umbels being arranged in axillary or terminal plicate racemes, 4-10 in. long. *Calyx* .1 in. long; teeth shorter than the tube. *Corolla* .25 in., white, tipped with light red. *Pod* of 1 or 2 joints, about .15 by .12 in., very thin, delicately veined, indented along both the sutures, glabrate or downy.

Common in the plains of ASSAM, generally in Sal areas or other types of deciduous forests, as far up as SIBSAGAR.

It is generally believed that if a branch of this plant is kept under the bed or anywhere in the house it drives away bed-bugs from it.

Flrs. 7-9. Fr. 11-1. leafless in March.

3. *Desmodium laburnifolium* DC. Vern. *Biyoni-haputa* or *Bor-Biyoni-haputa*, Ass. (Dan.); *Tangam-asing*,

Miri; *Samthai*, Mech; *Kobuelchick*, Kuki; *Bhuter-chira*, Beng.

A lanky shrub 6-8 ft. high; branches few, slender, terete or imperceptibly angled, glabrescent. *Leaves* 3-foliolate; common petiole .8-1.5 in. long, channelled; stipules .2-2.5 in. long, free, subulate. *Leaflets* 1-4 by .4-1.5 in., terminal usually largest, oblong-lanceolate, subcoriaceous, slightly pubescent along the nerves above, otherwise glabrous, dark-green and shining above, pale and sparsely adpressed, pubescent beneath. *Racemes* 4-12 in. long, lax; pedicels .2-.3 in. long. *Calyx* .1-.15 in. long; teeth lanceolate, as long as the tube, the lowest linear and longer than the others. *Corolla* whitish, .25-.35 in. long. *Pod* 2-4 by .15-.2 in.; joints 6-8, .3-.4 in. long, covered with short hooked hairs by means of which they stick to clothes and to the bodies of animals.

Brahmaputra Valley right up to Sadiya and in the Hills up to 4,000 ft., generally in shady damp localities.

Flrs. 6-9. Fr. 9-1.

4. *Desmodium laxiflorum* DC. Vern. *Khong-sir*, Khasi.

An erect undershrub 3-5 ft. high; branches angled, adpressedly grey-hairy. *Leaves* 3-foliolate, 6-10 in. long; common petiole 1.5-2 in. long, sulcate, grey-hairy; stipules persistent, .4-.6 in. long, subulate, striate, hairy. *Leaflets* 4-8 by 2-3 in., terminal largest, lateral somewhat oblique-ovate, ovate-elliptic or lanceolate, cuspidate-acute or shortly acuminate; base rounded, membranous, green and scabrid, puberulous above, somewhat pale and glaucous and more densely hairy beneath, ciliate along the marginal nerve; lateral nerves 10-12 on either side of the midrib, prominent, joining to form a marginal nerve; lateral petiolules .1-.15 in. long, short, hairy; stipels persistent, .2-.3 in. long, setaceous, grey. *Racemes* axillary and terminal, sometimes paniced, 6-15 in. long, lax-flowered, except towards the extremity; flowers fascicled; bracts lanceolate, .2-.3 in. long, pedicels .2-.35 in. long, slender, hairy, reflexed in fruit. *Calyx* about .08 in. long, densely hairy; teeth longer than the tube. *Corolla* purplish pink; standard .2 in. long,

lighter coloured than the wings and keel. *Pod* 1-1.5 by about .08 in., 6-8 jointed, scarcely constricted at the joints, covered with gland-based minute hooked hairs; joints about .2 in. long.

Sub-montane tracts in LOWER ASSAM; e.g., Barnihat, Rani, etc.; Sohrarim—*Clarke*, Haflong, *Craib*.

Flrs. 9-10. Fr. 12-1.

5. *Desmodium sequax* Wall. Vern. *Horu-biyoni-haputa*, Ass.; *Samthai*, Kach.

A cæspitose shrub usually up to 10 ft. in height; branches terete, clothed with short brown pubescence. *Leaves* 3-foliolate; common petiole .7-1.5 in. long, sulcate, angled, densely pubescent; stipules .08 in. long, ovate, densely brown-ciliate, caducous. *Leaflets* closely resembling those of *Desmodium sinuatum* Bl. in size and shape, 1.5-3.5 by 1-2.5 in., elliptic or rhomboid, tapering to a more or less acute tip, repand in the upper half, subcoriaceous, dark green and densely grey pubescent beneath; lateral nerves 4-5 on either half, conspicuous beneath, slightly arched. *Racemes* 2-3 in. long, terminal and axillary, rather lax, sometimes paniced; pedicels .15-.2 in. long, pubescent; bracts minute. *Calyx* about .08 in. long, broadly funnel-shaped, hairy outside; teeth deltoid, very short, strongly ciliate. *Corolla* light purple, about .3 in. long. *Pod* .5-.8 by .1 in., indented along both sutures; joints 6-8, rhomboid or lentil-shaped, as broad as long, soon separating, densely clothed with short hooked brown hairs.

SUB-HIMALAYAN TRACTS and the KHASI HILLS upto 5,000 ft. Nonai in DARRANG, Matharguri, Rajakata, etc., KAMRUP, Duragiri, GARO HILLS.

Flrs. 9-10. Fr. 12-1.

6. *Desmodium sinuatum* Bl.

An undershrub 6-8 ft. high; branches terete, indistinctly sulcate, minutely puberulous. *Leaves* 3-foliolate, 2-6 in. long; common petiole .5-1.5 in. long, sulcate, rusty hairy; stipules about .1 in. long, deltoid, closely ciliate. *Leaflets* 1.5-3.5 by 1-2.5 in., elliptic or rhomboid, acute, repand in the

upper half, subcoriaceous, dark-green and lightly adpressed hairy above, pale and grey-velvety beneath; lateral nerves usually 4 on either side of the midrib, oblique, much arched. *Racemes* 4-6 in. long, terminal and axillary, often branched; pedicels .15-.25 in. long, ascending or spreading, rusty-downy; bracts about .1 in. long, caducous. *Calyx* .08 in. long; teeth short, rounded. *Corolla* purple, about .25 in. long. *Pod* 1.1-1.5 by .08-.12 in., clothed with minute hooked brown hairs; joints 8-12, as broad as long.

KHASI HILLS, 3,000-5,500 ft., generally in shady ravines e.g., Un-ja-sai in Upper Shillong.

Flrs. 8-9. Fr. 11-12, but apparently remaining long on the plant after ripening.

7. *Desmodium racemosum* (Thunb) DC. Vern. *Ja-top-rit*, Khasi.

A handsome undershrub 4-5 ft. high; branches slender, terete, glabrescent. *Leaves* 3-foliolate; common petiole 1-2 in. long, thinly adpressed-hairy; stipules .1-.15 in. long, ovate or lanceolate. *Leaflets* 1-4 by .5-1.3 in., elliptic or lanceolate, sharply acute, entire or obscurely repand, membranous, light-green and glabrescent above, pale and very minutely adpressed pubescent beneath; lateral nerves 4-6 on either half, very slender, arched; lateral petiolules .1-.15 in. long, hairy; stipels .1 in. long, bristle-like. *Racemes* terminal and lateral, much paniced and corymbose, 2-5 in. long; pedicels capillary up to .6 in. in length, ascending; bracts .25-.3 in. long, lanceolate, cuspidate-acuminate, densely silky, caducous. *Calyx* about .1 in. long, sub-glabrous; teeth deltoid. *Corolla* pink, glabrous, about .3 in. long; standard obovate. *Pod* 1-2 by .2 in., on a short stout stalk, glabrescent, indented along the lower suture, the upper suture being nearly straight; joints 8-10, slightly longer than broad, rather strongly veined.

KHASI AND JAINTIA HILLS, 5-6,000 ft.

Flrs. 7-8. Fr. 9-11.

This plant has been described as *D. oxyphyllum* DC. in F. B. I., but this name applies to a different plant (*vide* Prain. Journal As. Society, Bengal LXVI-2). The name adopted is the one under which the Calcutta herbarium sheets have been identified by Schnieder.

8. *Desmodium sambuense* DC. Syn. *D. floribundum* G. Don. Vern.; *Ja-kythem*, *Ja-thoh*, Khasi.

A woody shrub 3-5 ft. high; branches angular, often switchy, densely pubescent along the ridges. *Leaves* 3-foliolate, 4-8 in. long; common petiole 1-2 in. long; sulcate, grey-silky; stipules .25-.4 in. long, lanceolate, cuspidate, paleaceous, strongly ciliate. *Leaflets* 1-3 by .6-1.5 in., ovate or obovate-oblong, acute or subacute, usually cuspidate, subcoriaceous, green and lightly adpressed hairy above, pale and densely grey-silky beneath; lateral nerves 6-8 on either half, nervules finely reticulate; petiolules about .1 in. long; stipels small, subulate. *Racemes* terminal and axillary, often paniced, 3-6 in. long; flowers in fascicles of 3-5 at the nodes; pedicels .2-.4 in. long, slender, hairy, ascending; bracts resembling the stipules, narrower upwards. *Calyx* .12 in. long, turbinate, hairy; teeth as long as the tube. *Corolla* .35-.4 in., pink or nearly white. *Pod* .8-1.2 by .12 in., indented along both sutures; joints 6-8, slightly longer than broad, clothed with adpressed short hairs.

Fairly common in the BRAHMAPUTRA VALLEY upto SIBSAGAR also in the KHASI HILLS upto 5,000 ft.

Flrs. 8-9. Fr. 9-10.

9. *Desmodium khasianum* Prain. Vern. *Deing-chakuriao*, Khasi.

A shrub 3-6 ft. high; stem grey, branches trigonous, sulcate; young parts silky pubescent. *Leaves* 3-foliolate; common petiole .7-1.4 in. long, sulcate, adpressed hairy; stipules .15-.2 in. long, lanceolate, cuspidate-acuminate, striate, ciliate. *Leaflets* 3, .8-2.5 by .5-1.5 in., ovate obovate or elliptic, acute or shortly cuspidate-acuminate, subcoriaceous, green and lightly adpressed hairy above, pale and densely hairy beneath; lateral nerves 5-6 on either half, arched, rather indistinct above; stipels about .1 in. long, setaceous. *Racemes* axillary or terminal, 3-5 in. long, solitary or in tufts of 5-6 pedicels, capillary, .3-.7 in. long. *Calyx* about .1 in. long, funnel-shaped, deeply divided, glabrous. *Corolla* purple, about .3 in. long; keel straight. *Pod* 1-1.8 by .1-.2 in., nearly straight along the upper suture, scalloped along the lower; joints 3-6 (less often upto 8), half

as long again as broad, reticulately veined on the faces, adpressed-hairy when young, glabrescent.

KHASI HILLS 4, -5,500 ft., *e.g.*, Mawmlah, Lynkyrdem, Nongstoin, Nongbri, etc.

Flrs. 8-9. Fr. 10-12.

10. *Desmodium concinnum* DC.

A handsome shrub with slender terete drooping branches; young parts grey-pubescent. *Leaves* 3-foliolate, common petiole .5-1 in. long, sulcate, covered with spreading hairs; stipules .3-.5 in. long, broadly subulate, paleaceous, striate. *Leaflets* 1-3 by .5-1 in., oblong, oblong-obovate or elliptic-oblong, rounded at both ends, minutely mucronate, subcoriaceous, green and glabrate above, pale and clothed with matted adpressed grey hairs beneath; lateral nerves 5-10 on either half, prominent beneath, very oblique, slightly arched; petiolules .05-.08 in. long; stipels setaceous, about .25 in. long. *Racemes* 3-9 in. long, terminal and at the ends of lateral branchlets or axillary, lax pilose; pedicels .3-.6 in. long, ascending or spreading, densely grey-pubescent; bracts .25-.4 in. long, ovate-lanceolate, shortly awned, striate, imbricating, densely silky, especially outside, caducous. *Calyx* .1 in. long, campanulate; teeth deltoid, rather short. *Corolla* pinkish or lilac, .25-.35 in. long. *Pod* about 1 by .12 in., straight along the upper suture; joints 4-6, minutely downy.

KHASI HILLS, 4,000 ft. in open grass-lands.

Flrs. 9-10. Fr. 11-12.

11. *Desmodium laxum* DC. Syn. *D. podocarpum* DC. Var. *laxum* Baker.

An erect usually unbranched semiherbaceous undershrub 2-3 ft. high; stem angular, minutely pubescent. *Leaves* 3-foliolate; common petiole 2-4 in. long; stipules small, subulate. *Leaflets* 3-6 by 1.5-3 in., lateral obliquely lanceolate, terminal ovate-lanceolate, shortly acuminate or acute; base narrowed, usually cuneate, membranous or chartaceous, somewhat hispid at first, but glabrescent when mature, green above, pale beneath; lateral nerves about 4 on either half,

much arched, the lowest sub-basal; lateral petiolules $\cdot 2\cdot 25$ in. long, pilose; stipels setaceous. *Racemes* 9-15 in. long, axillary and terminal, often paniced, very lax; bracts minute, linear. *Calyx* $\cdot 06$ in. long, turbinate, almost truncate, the teeth being very minute. *Corolla* pink, $\cdot 12$ in. long. *Stamens* 1-adelphous. *Pod* 1-2-jointed, lowest joint on stalk, $\cdot 3$ in. long; each joint $\cdot 3\cdot 35$ by $\cdot 15\cdot 2$ in., obliquely crescent-shaped or subtriangular, the lower suture almost touching the upper between the seeds; both sutures thickened, the upper also flattened.

Garampani in SIBSAGAR.

Flrs. 8-9. Fr. 11-12.

In var. *typica* leaflets are smaller, 1-2-3 in. long. KHASI and JAINTIA HILLS, 4-5,000 ft. Mann !

12. *Desmodium Scalpe* DC.

An undershrub 2-4 ft. high; branches terete, slender, patently downy. *Common petiole* $\cdot 5\cdot 1$ in. long, flattened, ciliate; stipules $\cdot 25\cdot 4$ in. long, lanceolate, persistent. *Leaflets* 3, $\cdot 5\cdot 4$ by $\cdot 3\cdot 3$ in., suborbicular or oblong-obovate, often emarginate, membranous, green and glabrate above, pale and finely downy beneath; lateral nerves about 8 on either half, very slender, slightly arched; lateral petiolules $\cdot 05\cdot 1$ in. long. *Racemes* mostly terminal, 2-12 in. long, very lax, pedicels filiform, $\cdot 2\cdot 1\cdot 5$ in. long; bracts caducous, $\cdot 15\cdot 2$ in. long, ovate-lanceolate, caudate, striate, ciliate on the margins. *Calyx* about $\cdot 1$ in. long, downy. *Corolla* bright-red, $\cdot 2\cdot 4$ in. long. *Pod* of 1-3 joints. *Joints* $\cdot 2\cdot 25$ by about $\cdot 1$ in., half-rhomboidal; apex oblique; upper suture thickened.

Apparently rare; KHASI HILLS, upto 4,000 ft.

Flrs. 8-9. Fr. 11-1.

13. *Desmodium confertum* DC.

An undershrub; branches terete, finely downy when young. *Common petiole* 1-1-5 in. long. *Leaflets* 3, 2-6 in. long, obovate or oblong, sub-coriaceous, glabrous above, pale, distinctly reticulate veined and minutely hairy beneath. *Racemes* axillary and terminal, the latter usually paniced, short, dense; bracts $\cdot 2\cdot 25$ in. long, scariosse; pedicels $\cdot 15\cdot 2$

in. long, ascending. *Calyx* .1-.15 in. long, turbinate, shortly toothed, scarcely hairy. *Corolla* .35-.4 in. long. *Pod* 1-1.5 by .2-.25 in., much indented along the lower suture; joints 3-4, twice as long as broad, densely clothed with spreading silky hairs.

KHASI HILLS upto 4,000 ft., apparently in grass lands.

14. *Desmodium polycarpum* DC.

An undershrub 2-4 ft. high with a creeping root-stock; branches somewhat sulcate or angular, with adpressed hairy extremities. *Leaves* 3-foliolate; common petiole stout, slightly margined; stipules about .5 in. long, subulate, setaceous. *Leaflets* sub-equal, 1-2.5 by .6-1.2 in., elliptic, oblong or obovate, rounded or slightly notched at the apex, sub-coriaceous, green and glabrous above, paler glaucescent and thinly adpressed-hairy beneath; lateral nerves 7-9 on either half, slender, slanting, arched; tertiaries more slender, very close, transverse, sub-parallel; petiolules of lateral leaflets about .1 in. long, grey-silky; stipels .15-.25 in. long, setaceous, very slender. *Racemes* terminal and axillary, 2-4 in. long, rather dense; bracts caducous, closely imbricating in bud, .15-.25 in. long, concave, lanceolate or ovate lanceolate, awned, striate, ciliate; pedicels capillary, erect, about .2 in. long. *Calyx* .08-.1 in. long; teeth longer than the funnel-shaped tube. *Corolla* purple, .2-.25 in. long. *Pod* .5-.8 by .1-.12 in., very thin, ciliate with hairs curled at the tips along the sutures; upper suture nearly straight; joints 5-8, slightly broader than long or length equalling breadth, reticulate, opening by the lower suture.

SIBSAGAR—Gaurisagar; KHASI HILLS, 4-5,000 ft.

Flr. and Fr. 6-8.

The pods stick together and persist long after ripening.

Var. *trichocaulon* also occurs in the KHASI HILLS, and differs from the type by its spreading hairs on the branches, laxer racemes, broader ovate-cuspidate bracts and larger and more densely hairy pods.

There is an intermediate form between these in which the hairs at the extremities are spreading, and bracts and pods as in the type.

Mamloo Forests—4,000 ft.

15. *Desmodium ormocarpoides* DC.

A slender erect undershrub; stem usually unbranched, angled, downy when young. *Leaves* 1-foliolate; petiole .5-1 in. long; leaflet 4-7 in. long, ovate or lanceolate, chartaceous or subcoriaceous, somewhat downy beneath. *Racemes* terminal, 6-9 in. long; flowers in few-flowered distant fascicles; bracts minute, setaceous; pedicels .25-.35 in. long. *Calyx* .08 in. long, with short deltoid teeth. *Corolla* pale-violet. *Pod* pendulous, 3-4 by about .25 in., constricted along both the sutures; joints 6-8, flattened, at least twice as long as broad, ribbed, covered with minute hooked hairs.

Gauhati, Kurz ! MANIPUR, Meebold ! and possibly in many other similar localities.

Flowering and fruiting time not known.

16. *Desmodium gangeticum* DC. Vern. *Nai-khong*, Khasi; *Salpan* or *Saluani*, Beng.; *Sala-parni*, Sans.

A suberect undershrub 3-4 ft. high; branches sub-terete, grey-downy towards the extremities. *Leaves* 1-foliolate; petiole .5-1.3 in. long; stipule .2-.35 in. long, subulate, striate, ciliate. *Leaflets* 2-4 by 1.5-2 in., ovate to lanceolate or elliptic lanceolate, acute, rounded at the base, membranous or chartaceous, glabrous or puberulous along the nerves and somewhat shining above, adpressed grey hairy or glaucescent beneath; lateral nerves 8-10 on either half, nearly straight; stipels setaceous. *Racemes* 6-12 in. long, mostly terminal or from upper axils, slender, often with short lateral branches, rather lax, pubescent, usually with reflexed hairs pointing upwards; pedicels .08-.2 in., ascending, strigillose; bracts minute, setaceous. *Calyx* .08 in. long; teeth lanceolate, longer than the tube. *Corolla* about .2 in. long, purplish white. *Pod* .5-.7 by about .1 in., deeply indented along the lower suture; joints 6-8, slightly longer than broad, usually clothed with minute hooked hairs.

SUB-MONTANE tracts upto 4,000 ft.

The root of this plant is used as a febrifuge by Hindu physicians.

Flrs. 8-10. Fr. 10-12.

17. *Desmodium latifolium* DC. Vern. *Gach-bionihaputa*, Ass.; *Bagh-chhala*, Tharua; *Soh-pyrtheit*, *La-hniu*, Khasi; *Nonth-arong*, Mik., *Achhak-kimachan*, Garo.

An undershrub 4-6 ft. high; branches terete, striate, densely hirsute. *Leaves* 1-foliolate; common petiole .3-.6 in. long, densely hairy; stipules .2-.3 in. long, subulate. *Leaflets* 2-5 by 1.5-3.5 in., broadly ovate, obtuse to subacute tip, generally mucronate; base truncate or cordate, chartaceous, hispid with stiff white hairs above, densely soft-pubescent beneath; lateral nerves 7-8 on either side, the first 1-3 of which are subbasal; stipels setaceous. *Racemes* 2-6 in. long, axillary or terminal, the latter often paniced, ascending, rather congested; bracts densely brown, hairy, .2-.25 in. long, linear subulate, plumose hispid; pedicels very short. *Calyx* .08 in. long, campanulate, hairy; teeth lanceolate to triangular, about equalling the tube. *Corolla* purplish, .25-.35 in. long. *Pod* .6-1 by .1 in., slightly falcate, indented along both the sutures, densely clothed with dun hooked hairs; joints usually 3-6, about as broad as long.

BRAHMAPUTRA VALLEY from Dalu and Goalpara to Lumding on the south and Charduar on the north, generally associated with Sal. The fibre of the bark can be used for manufacturing paper.

Flrs. 9-11. Fr. 11-12.

18. *Desmodium retroflexum* DC.

Small undershrub; branches terete, woody with short spreading hairs when young. *Leaves* usually 1-foliolate; common petiole .5-1 in. long, deflexed at the extremity. *Leaflets* 1-2 in. diam., orbicular-cordate, coriaceous, glabrous and green above, densely adpressed-silky beneath, rarely with a pair of much smaller lateral leaflets. *Racemes* about an inch long, terminal or axillary, very dense. *Calyx* .08 in. long, bristly. *Corolla* .2-.25 in. long. *Pod* .35-.5 by .1 in., minutely hairy; joints 3-5, as long as broad.

KHASI HILLS, Jenkins!

19. *Desmodium triquetrum* DC. including *D. auriculatum* DC. Vern. *Ulucha*, Ass., Miri & Abor; *Ettang*, Garo.

An erect or suberect undershrub, generally 3-5 ft. long

but often attaining 6-8 ft.; branches sharply triquetrous, strigose along the ridges when young. *Leaves* 1-foliolate; petiole .5-1.3 in. long by .1-.2 in., winged; wing oblanceolate, .25-.4 in. broad, ending in stiff points; stipules .5-.7 by .1-.2 in., tapering from a broad base, sub-persistent, striate. *Leaflets* 2.7.2 by .5.2.2 in., oblong-lanceolate, rounded or subcordate at the base, acute or shortly acuminate, entire, subcoriaceous, sub-glabrous or scaberulous above with scattered bristle-like white hairs and with such hairs on the midrib and nerves beneath; lateral nerves 15 to 19 on either half, usually much arched and strongly reticulate between. *Racemes* 4-12 in. long, axillary or terminal and sometimes paniced, covered with minute pubescence and with stiff adpressed hairs, specially along ridges; pedicels .1-.2 in. long, minutely hairy; bracts .2 in. long with smaller ones at the base. *Calyx* about .1 in. long, campanulate, with scattered hairs outside; two upper teeth combined forming one broad deltoid tooth; the lowest tooth linear and the longest. *Corolla* purplish pink, .2-.25 in. long; keel acute. *Stamens* monadelphous, the upper being free above the middle. *Pod* 1-2 by .2 in., flat, clothed throughout with matted hairs, slightly indented along the lower suture; joints 5-8, slightly broader or as broad as long; seeds escaping from an opening at the upper end after fall of the terminal joints.

Fairly common in the plains throughout the Province and upto 4,000 ft. in the GARO, KHASI and MIKIR HILLS. Generally in grass-lands.

The Abors and Miris of Upper Assam use the leaves as a substitute for tea.

Flrs. 10-12. Fr. 11-3.

The following are very closely allied forms and probably not more than varieties of the last :—

Desmodium alatum DC. incl. *D. Triquetrum* F. B. I. in part.

Shrub 4-5 ft. high. Differs from the foregoing as follows :—

Leaves often much narrower than in the last species; stipules more persistent, about .4-1 by .15 in. *Racemes* more densely flowered; flowers smaller, about .2 in. long, light pink with dark purple veins at the base of the petals. *Pods* broader sometimes, nearly .5 in. and much thinner, 3-7 jointed, glabrous, shining, very finely though somewhat distantly reticulate.

SYLHET—Managuli Hill, CACHAR (between Ghuttermukh and Changsil) Prazer! LAKHIMPUR—Clarke! KHASI AND JAINTIA HILLS, Mousto, Shaila (Shella?), Nongklow—Clarke.

Desmodium pseudo-triquetrum DC. Syn. *D. Triquetrum* F. B. I. in part.

A trailing undershrub. *Branches* 3-gonous-usually ciliate along the angle. *Leaves* smaller than those of *D. triquetrum* or *D. alatum*, glabrous or nearly so above, pilose along the nerves beneath at least till mature; lateral nerves about 8-12 on either half, wings narrower than in *D. triquetrum*; stipules .4-.8 in. by .15-.2 in. long, persistent. *Flowers* about the same size as those of *D. alatum*, but on shorter pedicels. *Pods* densely hispid along the edges, specially when young, glabrous or puberulous and finely reticulate on the sides.

North-East Frontier—Dipimukh, KHASI HILLS upto 4,000 ft., SIBSAGAR—Master! GOALPARA, Hamilton! SYLHET—Wallich! Kohima—Prain!

The leaves are used like tea by Mikirs and Abors.

Flrs. 9-10. Fr. 10-12.

20. Desmodium gyrans DC. Vern. *Gorachand*, Beng.; *Kali-manac*, Kh.; *Mushud-biphang*, Mech.; *Samphleng-gap*, Garo. The telegraph plant.

A semi-herbaceous and somewhat variable undershrub usually 4-5 ft. high; stems terete, indistinctly striate, green, glabrous, usually unbranched. *Leaves* normally 3-foliolate, but the lateral leaflets, if present, are reduced to very small sizes or are altogether absent, sometimes by early fall; common petiole .5-1.5 in. long; stipules .3-.6 in. long, subulate with a broad base, erect, striate. *Terminal leaflets* 1.5-4 by .3-1.5 in., oblong or oblong-lanceolate, obtuse at both ends, quite entire, rather membranous, almost glabrous and often with irregular, glaucous blotches above, glaucous and more or less densely adpressed-pubescent beneath; main lateral nerves 7-10 on either half, oblique, arched, very slender. *Lateral leaflets* when present .25-.7 by .05-.12 in., rotating by jerks under atmospheric stimules; petiolules .06-.15 in. long, slender; stipels about the same length, very slender. *Racemes* axillary and terminal, the latter often branched, 2-6 in. long; pedicels .2-.3 in. long, finely downy; bracts about .25 in., caducous, ovate-cuspidate, concealing the flower-buds. *Calyx* about .1 in. long, campanulate; teeth deltoid, small. *Corolla* .25-.4 in. long, dull-purple. *Stamens* diadelphous. *Pod*

1-1·7 by ·2 in., falcate, sub-glabrous or glabrescent, indented and at length continuously dehiscent along the lower suture; seeds reniform, compressed, with a prominent winged strophiole.

BRAHMAPUTRA VALLEY upto Dhansiri-mukh, and upto 5,500 ft. in the KHASI, JAINTIA and GARO HILLS, generally in grass-lands.

Flrs. & Fr. 10-2.

Var. *Roylei* which is a taller undershrub with larger leaves occurs in the southern parts of the JAINTIA HILLS and possibly in similar localities elsewhere.

21. *Desmodium gyroides* DC.

A shrub 5 to 10 ft. in height closely allied to the last species; stem freely branched; branches terete, densely grey-hairy when young. *Leaves* normally 3-foliolate, but often 1-foliolate by supression; common petiole ·5-1·2 in. long; stipules ·3-·7 in. long, subulate with an attenuated fine point, striate, sub-persistent. *Leaflets* ·7-2·5 by ·5-1·3 in., the side ones when present, being much smaller than the terminal, ovate elliptic or obovate, obtuse, sometimes emarginate at apex, membranous or chartaceous, green, often blotchy and very thinly pubescent above with minute adpressed hairs, glaucous and more or less densely adpressed hairy beneath; lateral nerves 5-7 on either half, slender, arched; stipels ·15-·2 in. long, bristle-like. *Racemes* axillary and terminal, usually branched, 2-5 in. long; pedicels ·2-·3 in. long, very hairy, elongating in fruit; bracts ·15-·25 in. long, broadly ovate, striate, strongly ciliate, caducous. *Calyx* campanulate, about ·08 in. long. *Corolla* ·2-·3 in. long, purplish. *Stamens* diadelphous. *Pod* 1-1·5 by ·15-·2 in., indented along the lower suture and dehiscing along it in scallops to set free the seeds, covered with intricate harsh brown hairs, curling up as in the last species after dehiscence; joints 3-10, as broad as or broader than long; seeds reniform, black with a winged strophiole.

Throughout the BRAHMAPUTRA VALLEY from GOALPARA to SIBSAGAR. Not noticed in LAKHIMPUR.

Flrs. 10-11. Fr. 11-2.

Desmodium parvifolium DC.

A much-branched prostrate wiry herb; branches hairy. *Leaves* 1-3-foliolate; common petiole capillary; stipules .1-.4 in. long, scarious, striate. *Leaflets* of two kinds, the smaller generally not exceeding .15 in. in diam., orbicular and much crowded, and the larger up to .5 in. in length, ovate or elliptic, not so crowded, both glabrous above, sparsely hairy underneath; stipels microscopic. *Racemes* numerous, terminal and lateral upto 2 in. long; pedicels .3-.5 in. long, filiform, rusty, hairy; bracts about .1 in., lanceolate or ovate caudate, concave, densely pubescent. *Calyx* .1-.15 in. long; teeth subulate, long-hairy. *Flowers* blue or pinkish. *Standard* orbicular, .25 in. diam. *Stamens* 2-adelphous, alternately sterile; keel petals spurred. *Pod* .3-.5 by .1 in., indented between the joints along both the sutures; joints 2-4, rarely 1 or 5, puberulous when young, veined in a regular pattern.

Var. *macrocarpum* has pods with broader joints and the upper suture straight or nearly so.

KHASI HILLS 4,500 ft., e.g. Nongstoin, Shillong, etc.

The leaves are good as cattle fodder and are used as a vegetable in Chota-Nagpur.

Flrs. & Fr. 9-11.

Desmodium Griffithianum Benth.

A trailing herb 1-2 ft. long, shaggy with fine spreading hairs. *Leaves* 3-foliolate; common petiole .5-1 in. long. *Leaflets* .5-1 in. long, terminal largest, obovate or oblong, sub-coriaceous, glabrous above, adpressed-hairy beneath. *Racemes* terminal, 2-6 in. long, dense towards the top; pedicels .1-.15 in. long, silky; bracts .25-.35 in. long, ovate cuspidate, densely silky. *Calyx* .1-.12 in. long, hairy; teeth deep, setaceous. *Corolla* .2-.25 in. long, bluish purple, exserted. *Pod* .5-.6 by about .1 in.; joints 4-5, obscurely downy.

KHASI HILLS, 4,500 ft.

Desmodium triflorum DC.

A cæspitose and much branched trailing perennial herb upto 2 ft. in length, often rooting at the nodes, covered with fine spreading hairs. *Leaves* 3-foliolate, scarcely exceeding .7 in. in length; common petiole .15-.25 in. long; stipules .1 in. long, lanceolate, persistent. *Leaflets* .12-.5 in. long, ovate, truncate or emarginate, with scattered adpressed hairs beneath. *Flowers* very small, white or purple, generally 1-3 together from the axil of the upper leaves; pedicels .25-.35 in. long, capillary. *Calyx* about .1 in. long; teeth long, setaceous. *Pod* about .5 by .12 in., somewhat curved, indented along the lower suture; joints 3-5, rather longer than broad, pubescent or nearly glabrous, reticulate-veined.

Common in meadows upto 5,500 ft. in the hills. An excellent fodder.

Flrs. & Fr. chiefly 8-12.

Desmodium heterophyllum DC.

Similar to the above in habit but larger. *Leaves* 3-foliolate upto 1.5 in. in length; common petiole .35-.5 in. long, pubescent; stipules .12 in. long, caudate-acuminate, persistent. *Leaflets* obovate-oblong, .5-1 in. long, hairy beneath. *Flowers* purple, axillary, solitary or two together or in 2-6-flowered lax racemes; pedicels .5-.7 in. long; bracts lanceolate, deciduous. *Calyx* as in the last species, but teeth longer. *Pod* .5-.7 by .12-.15 in., much indented along the lower suture, glabrescent; joints 4-5, as broad as long.

Plains of both valleys and in the KHASI HILLS, usually in meadows.

Flrs. & Fr. probably at the same time as the last species.

Desmodium oblongum Wall.

A slender under-shrub; stem hairy. *Leaflets* oblong. *Flowers* in lax much branched, paniced racemes.

Aka Hills (15303).

Desmodium dioicum DC.

An undershrub (woody); stem reddish brown, glabrous. *Leaves* usually 3 foliolate, elliptic, entire, acute, coriaceous, glabrous. *Racemes* 4-6 in. long. *Pods* moniliform, 1-2 in. long, densely villous.

Aka Hills. (15307).

13. ABRUS Linn.

Dextrorse twining shrubs with woody stems. *Leaves* paripinnate; rachis ending in a bristle; stipules lanceolate, deciduous. *Leaflets* opposite, shortly petioluled; stipels minute, rigid, persistent. *Flowers* in fascicles in dense axillary racemes or branchlets; bracts and bracteoles small, deciduous. *Calyx* campanulate, almost truncate; the teeth being very short. *Corolla* much exserted; standard broadly ovate, narrowed down to a short claw, slightly adnate to the staminal tube. *Stamens* 9 in a sheath, the 10th absent. *Ovary* subsessile, many-ovuled; style short, incurved, not bearded; stigma capitate. *Pod* more or less compressed, thinly septate between the seeds.

Leaflets not exceeding .3 in. in width; pod	
turgid, 3-5 seeded, globose or ovoid.	1. <i>A. precatorius</i> .
Leaflets up to .5 in. in width; pod flat, 6-10	
seeded; seeds compressed.	2. <i>A. pulchellus</i> .

1. Abrus precatorius Linn. Vern. *Latur-mani* or *Ratur-mani*, Ass.; *Kunch*, Beng.; *Gunja*, Hind. & Sans. Crab's eyes, Eng.

A handsome twining shrub. *Leaves* 2-3·5 in. long; stipules ·15 in. long, subulate. *Leaflets* 20-40, ·4-1 by ·2-·3 in., oblong-ligulate, minutely apiculate, membranous, glabrous or thinly silky beneath; stipels minute. *Flowers* reddish or dull white, clustered on tubercles in dense pedunculate racemes, which are shorter than or sometimes as long as the leaves; peduncle often leaf-bearing; pedicels very short. *Calyx* ·1-·15 in. long, truncate, thinly silky. *Corolla* ·3-·5 in. long; standard ovate, acute, narrowed to a short claw, wings oblong, falcate and shorter than the arcuate keel. *Pod* 1-1·7 by ·4-·5 in., 3-5 seeded, oblong, with a sharp deflexed beak, thinly pubescent, turgid but thinly septate between the seeds. *Seeds* about ·2 in. long, generally two-thirds scarlet or white and the rest jet-black, sometimes wholly white, rarely wholly black, smooth, shining.

On bushes in scrub jungles in the plains of both VALLEYS.

The roots, leaves and seeds are used medicinally. The seeds which are said to weigh constantly about 1·75 grains are used by Indian jewellers as their lowest unit of weight-rati. The seeds contain a poisonous principle known as *abrin*.

Flrs. 8-9. Fr. 12-1.

2. Abrus pulchellus Wall. Vern. *Mei-marang-theng*, Khasi (Sylhet border).

Of the same general habit as the foregoing species. *Leaves* 3-5·5 in. long. *Leaflets* 16-30, ·5-1·3 by ·25-·6 in., oblong or oblong-obovate, shortly apiculate with scattered adpressed hairs beneath. *Flowers* pinkish, ·4-·5 in. long, in clusters arranged on protuberances on one sided, long peduncled, terminal and axillary racemes, usually exceeding the leaves; peduncles considerably lengthening in fruit. *Calyx* about ·1 in. long, campanulate, with a wavy mouth. *Pod* 2·5-3 by ·4-·5 in., compressed, adpressed hairy outside, 6-10 seeded. *Seeds* compressed, ellipsoid, about ·2 in. diam., uniformly dark-brown or black.

In about the same localities as the last species, but more common in the vicinity of hills.

Flrs. 9-10. Fr. 11-12.

PISUM Linn.

Pisum arvense Linn. Vern. *Matar*, Beng. & Hind.; *Matar-mah*, Ass.

An annual scandent herb with hollow stems. *Leaves* paripinnate, the rachis ending in a tendril; stipules auricled, often larger than the leaflets. *Leaflets* 2-3 pairs, .3-.5 in. long, obovate or elliptic, toothed. *Flowers* generally purple. *Staminal* tube truncate. *Style* firm, dilated into a sheath. *Pod* turgid, 1-1.5 in. long, 3-5 seeded. *Seeds* globose but with lateral depressions, mottled.

Cultivated as a field crop, often in combination with mustard, in the LOWER BRAHMAPUTRA VALLEY.

Pisum sativum Linn. Vern. *Matar*, Hind. & Beng. & Ass.—Very closely resembling the above in almost all respects excepting the colour of the flower which is always white and the size of the plant and of its pods and seeds. The pods of some varieties attain 6 in. by 1 in. and the green seeds .5 in. diam. The mature seeds are ordinarily about .4 in. diam., globose and dry, usually pale yellow.

This handsome and useful plant has begun to be cultivated in gardens in towns and their suburbs.

14. SHUTERIA W. & A.**Shuteria vestita** W. & A.

A wiry climber with patently hairy stem. *Leaves* 3-foliolate; common petiole 1-2 in. long, very slender, patently hairy; stipules .15-.2 in. long, oblong-lanceolate, scarious; persistent. *Leaflets* 1-2.5 by .8-1.5 in., ovate; apex obtuse and cuspidate, rounded or subcordate at the base, green and usually glabrous or nearly so above, and adpressed grey-pubescent beneath; lateral nerves 5-6 on either half, very slender; lateral petiolules .1-.15 in., stipels setaceous. *Racemes* 1-3 in. long, sessile, dense, often fascicled; patently hairy; bracts small, rigid, lanceolate, persistent; pedicels short. *Calyx-tube* deeply campanulate, gibbous, about .15 in. long, densely hairy; teeth slender, shorter than the tube. *Corolla* reddish or purplish, about .5 in. long; standard with fine purple veins, slightly exceeding the keel, not spurred; wings spurred; keel petals connate, both wings and keel tipped with purple. *Stamens* 2-adelphous. *Ovary* many-ovuled; style incurved, filiform, beardless. *Pod* 1-1.25 in. long, linear, compressed, shaggy with rusty hairs, 5-6 seeded.

KHASI HILLS, 4,500 ft., chiefly in forest glades.

Fl. & Fr. 11-1.

Var. *glabrata* also occurs in the same localities which differs from the type by having glabrescent leaflets and calyx.

S. hirsuta Baker, also occurs in the KHASI HILLS. The stem is more rigid and more densely hairy with reflexed hairs, the leaves are coated with adpressed hairs on both surfaces, the racemes are peduncled and laxer flowered and the flowers are purplish.

15. DUMASIA DC.

Slender climbing herbs. *Leaves* pinnately 3-foliolate; leaflets with minute stipels. *Flowers* in axillary racemes; bracts small; bracteoles minute. *Calyx tube* cylindrical, gibbous, much obliquely truncate. *Corolla* yellow, exserted; standard obovate, clawed, spurred; wings and keel very long-clawed, adherent above the claws. *Stamens* 2-adelphous. *Ovary* linear; style long, flattened upwards, not bearded. *Pod* linear, falcate, torulose. *Seeds* subglobose; testa hard, blue-black.

Leaves long petioled; leaflets distinctly petioled, ovate; corolla twice as long as the calyx-tube.

1. *D. villosa*.

Leaves subsessile; leaflets subsessile, suborbicular; corolla only slightly exceeding the calyx-tube.

2. *D. cordifolia*.

1. *Dumasia villosa* DC.

A slender twiner with thinly hairy wiry stem. *Petiole* 1-2 in. long, very slender; stipules subulate, .15 in. long. *Leaflets* 1.5-3 by 1-2 in., ovate, obtuse, obscurely mucronate, subcuneate or rounded at the base, membranous, dark-green above, paler underneath, thinly adpressed pilose on both surfaces; lateral nerves 5-6 on either half, lowest pair from near the base and strongest petiolules about .1 in. short, very slender. *Calyx-tube* .2-.3 in. long, thinly hairy outside. *Corolla* yellow, .5-.7 in. long. *Pod* dun-velvety, 1-2 in. long, 2-4 seeded, torulose between the seeds.

KHASI HILLS, 4,600 ft., e.g., Kynshi, Mawphlang, etc., Var. *leiocarpa* with subglabrous leaflets and pods also occurs in the same localities.

Flrs. & Fr. 7-10.

2. *Dumasia cordifolia* Benth.

Differs from the above by subsessile leaves and leaflets, the latter being cordate-orbicular much smaller and glabrous; shorter, laxer and fewer-flowered racemes, glabrous calyx and less exserted corolla.

KHASI HILLS Hk. f. & Th.

Glycine Soja Benth. Syn. *Glycine hispida* Maxim. Vern. *Patni-jokra*, Ass.; *U Rymbai-kutung*, Khasi. The Soy Bean.—A suberect stout annual herb, 1-2 ft. high, densely covered with patent rusty hairs. *Leaves* 3-foliolate; common petiole 2-6 in. long, hairy; stipules about .2 in. long, subulate, concealed in the hairs of stem. *Leaflets* 1.5-3.5 by 1-1.25 in., oblong-lanceolate, membranous, hairy on both surfaces; lateral nerves about 5 on either half, faint; lateral petiolules .1-1.15 in. long, densely hairy. *Racemes* axillary, sessile with few congested flowers. *Calyx* reddish, little exserted; petals subequal. *Stamens* almost completely monadelphous. *Ovary* subsessile; style short, incurved, beardless. *Pod* 1-1.5 in. by .3-3.5 in., flattish, recurved, narrowed towards the base, densely hairy, 1-3 seeded. *Seeds* brown, ellipsoid, compressed, .3-4 in. long, with a long hilum.

Cultivated as a field crop in the KHASI HILLS for the seeds which are used as a pulse and as fodder for cattle.

Flrs. 9-10. Fr. 11-1.

16. TERAMNUS Sw.

Teramnus flexilis Benth. Vern. *Nongsangpher*, Mik.

A twining herb with terete, sparingly adpressed hairy, green stems. *Leaves* pinnately 3-foliolate; common petiole 4-5 in. long, slender, channelled; stipules obliquely lanceolate. *Leaflets* 4-5 by 2-2.5 in., ovate or ovate-oblong, acuminate, rounded at the base, membranous, dark-green above, paler beneath, more or less adpressed hairy on both surfaces; lateral nerves 5 or 6 on either half; lateral petiolules about .15 in. long, covered with bristles; stipels minute, setaceous or subulate. *Racemes* axillary, up to 1 in. long, shaggy with white bristles, the flowers crowded at the extremity. *Calyx-tube* about .12 in. long, campanulate, hairy outside; teeth deltoid, sub-equal. *Corolla* reddish, slightly exserted; petals nearly all equal; standard not spurred. *Stamens* monadelphous, alternate stamens sterile. *Ovary* sessile, many ovuled; style short, beardless. *Pod* 2.5-3 by .2 in., straight, flat, sparingly adpressed hairy, 8-10 seeded, septate between the seeds.

Fairly common in forest glades and on fallow lands in the plains and upto 2,000 ft. in the hills.

Flrs. 9-10. Fr. 11-12.

17. MUCUNA Adans.

Perennial or annual climbing herbs or shrubs. *Leaves* large, pinnately 3-foliolate, minutely stipellate. *Flowers* large, usually dark-purple, generally fascicled on the tumid nodes of the axillary or lateral racemes which are sometimes corymbose. *Calyx* campanulate, the two upper teeth connate. *Corolla* much exserted; keel rostrate, much exceeding the standard and generally slightly exceeding the wings. *Stamens* 2-adelphous; anthers 2-morphous, alternately basi-fixed and dorsifixed. *Ovary* sessile, many-ovuled; style incurved, beardless. *Pod* hard, usually covered with irritating bristles.

I. Pod obliquely plaited on the faces :—

- | | |
|-----------------------------------|---------------------------|
| Pod winged, 2-4 seeded. | 1. <i>M. imbricata</i> . |
| Pod not winged, 1-seeded. | 2. <i>M. monosperma</i> . |

II. Pod not plaited, nor winged :—

- | | |
|--|---------------------------|
| A. Pod 12-18 in. long, 8-12 seeded. Leaves glabrous. | 3. <i>M. macrocarpa</i> . |
|--|---------------------------|

- | | |
|---|--|
| B. Pod not exceeding 4 in. in length, 5-6 seeded :— | |
|---|--|

- | | |
|---|--------------------------|
| Pod without longitudinal furrows. | |
| Peduncles conspicuously bracteate. | |
| Leaves adpressed hairy. | 4. <i>M. bracteata</i> . |
| Pod longitudinally furrowed. Bracts small. Leaves grey-silky beneath. | 5. <i>M. prurita</i> . |

1. *Mucuna imbricata* DC. Vern. *Mekuri-ghila*, Ass.; *Tapo-tapi-rubi*, Abor; *Suthai-makhra*, Kach.

A large climber with slender glabrescent branches. *Common petiole* 3-5 in. long, slender. *Leaflets* 4-6 in. long, lanceolate, ovate lanceolate or elliptic, more or less acuminate, membranous, glabrous above, sparsely yellow hairy beneath; petiolules stout, .25 in. long. *Racemes* 4-12 in. long, pendulous, long peduncled, laxly 8-10 flowered; bracts large, caducous; pedicels .5 in. long. *Calyx* .7 in. long with a few irritating bristles; teeth nearly as long as the tube. *Corolla* 2-2.25 in. long, dull purple; keel abruptly reflexed at the tip; standard 1 in. broad. *Pod* 4-6 by 2 in., oblong, 2-4 seeded, with two wings on each suture about .5 in. broad,

and with close oblique plaits on the faces, densely covered with brittle ferruginous bristles. *Seeds* large, flat.

UPPER ASSAM, not very common. Nizamghat in the N. E. FRONTIER DISTRICT to the Dhansiri Reserve, NOWGONG.

Flrs. Rainy season. Fr. 12-4.

2. *Mucuna monosperma* DC. Vern. *Mei-sia-ryntim*, Khasi.

A large woody climber; branches longitudinally ribbed; branchlets slender, glabrescent. *Common petiole* 2-4 in. long, slender, generally red, ferruginous-pubescent; stipules caducous. *Leaflets* 3-5 by 2-3·5 in., ovate-oblong, the lateral very oblique, abruptly acuminate, quite entire, chartaceous, glabrous above, covered when young with ferruginous pubescence underneath; midrib and lateral nerves generally red, the latter 5 or 6 on either half, slender, much arched, ultimate nervules very closely and finely reticulate; petiolules ·25-·3 in. long, stout, terrete, pubescent. *Racemes* axillary or from old nodes, 2-4 in. long, subcorymbosely 6-12 flowered, short peduncled; rachis coloured or zigzag, velvety, sometimes reduced to tendrils; pedicels ·5-·8 in. long, velvety. *Calyx* bowl-shaped, ·5-·6 in. across, with scattered bristle-like reddish hairs both inside and outside, hispidly velvety outside; lobes short. *Flowers* about 2 in. long; standard ·7-1 by ·5-·7 in., suborbicular, dull purple; wings 1·2-1·5 by ·3-·35 in., oblong, conforming to the keel, dull purple; keel slightly longer but narrower than the wings, greenish; standard outside, wings and keel towards the base with scattered reddish brown bristles. *Pod* about 2 by 1·3 in., ovate-ovoid, 1-seeded, densely covered with reddish or dark-brown irritating bristles, which on young pods completely conceal the plaits on the faces.

Along the southern foot of the KHASI HILLS between Shella and Nongkla, generally in swampy localities.

Flrs. 11-12. Fr. 12-2.

3. *Mucuna macrocarpa* Wall. Vern. *Mei*-, *Jermi*- or *Thar-jendru*,—*jenreu* or —*jinriu*, Khasi; *Dushmai-doukha*, Kach.

A very large woody climber with whitish lenticellate

bark exuding sticky watery gum from cuts; branches obscurely sulcate, at first adpressedly grey-pubescent, glabrescent with age. *Common petiole* 2-6 in. long, slender. *Leaflets* 3-7 by 2-5 in., elliptic-ovate, lateral oblique, abruptly acuminate, coriaceous, adpressed grey-hairy on both surfaces when young, soon glabrescent above and nearly so beneath; lateral nerves about 5 on either side of the midrib, prominent beneath, arched; petiolules .3-.4 in. long, brown-tomentose. *Racemes* axillary and generally solitary on short branches, but more generally in fascicles from the old wood, often branched above the short peduncle; rachis densely grey-velvety; bracteoles .5-.7 in. long, ovate-oblong, velvety. *Calyx* about 1 in. long, somewhat gibbous, dark-green, with deciduous irritating bristles; lobes short, unequal. *Corolla* 2-3 in. long; petals covered outside with similar deciduous bristles as the calyx; standard 1.2-1.5 in. broad, greenish; wings 1.7-2 by .6-.7 in., fleshy, purple; keel 1.7-2.5 in. long, abruptly turned up and gradually narrowed to the tip. *Style* glabrous. *Pod* 12-18 by 1.5-2 in., on a stipe, 1.5-2.5 in. long, laterally compressed, 8-12 seeded, constricted between the seeds, channelled along the suture, velvety when young. Seeds 1.2 by 1 in., rhomboid or ellipsoid; testa dark-brown, horny, glabrous and shining outside; hilum round three quarters of the edge (giving the seed the appearance of a leather purse).

NORTH CACHAR and KHASI HILLS upto 4,500 ft., also in the neighbourhood of Dulong-mukh, NORTH LAKHIMPUR (not very common).

Flrs. 3-4. Fr. 9-11., but apparently remaining long on the plant after maturing.

4. *Mucuna bracteata* DC. Vern. *Wakmi*, Garo.

An annual or perennial climber; branchlets at first adpressed grey pubescent, glabrescent. *Common petiole* 4-5 in. long, slender, nearly glabrous. *Leaflets* 2.5-4 by 1.7-3.5 in., terminal rhomboid, lateral deltoidly oblique, acute or subacute, membranous or chartaceous, dark-green and glabrescent above, finely adpressed pubescent beneath; lateral nerves 6-7 on either side of the midrib; lateral petiolules .15-.2 in. long, hairy; stipels subpersistent, about

·15 in. long, setaceous. *Racemes* axillary, 6-10 in. long, bracteate down to the base; rachis softly pubescent; bracts ·5-·6 in. long, ovate or obovate, tip usually pointed, pubescent and also with scattered bristles. *Flowers* about 1·5 in. long, blackish-purple. *Calyx* ·4-·5 in. long; teeth linear, covered with grey tomentum and scattered bristly hairs; standard broad, wings falcate, much longer than the standard, ciliate along the base on the outer margin; keel exceeding the wings. *Pod* 3-4 in. long, 5-6 seeded, almost terete, when fully mature, serpentine curved, covered with reddish bristles, not longitudinally ribbed.

UPPER ASSAM, generally in glades in evergreen forests, also in the GARO and KHASI HILLS, upto 3,000 ft., -not very common.

The seeds and the hairs of the pod have probably the same economic uses as those of the next species *M. prurita*.

Flrs. 1-2. Fr. 3-5.

Mucuna exserta C. B. Clarke Ms. ex. C. E. C. Fisher.

A perennial or annual climber; branchlets striate; common petiole glabrescent, striate, 1·2-7·8 in. long. *Leaflets* rigid, 2·7 by 1·2-4·5 in., terminal rhomboid; lateral obliquely ovate, broader half outwards, acute or acuminate, margins subundulate, glabrous or nearly above, adpressed brownish pubescent beneath; main lateral nerves 5-6 on either half, ultimate reticulations fine; petiolules ·15-·2 in. long. *Racemes* terminal, upto 9·5 in. long, densely clothed with soft brown pubescence mixed with stiff, red irritating bristly hairs. *Bracts* upto ·8 in. long, those at the base of the raceme more or less persistent. *Flowers* about 1·5 in. long; pedicels ·2-·5 in. long. *Calyx* about ·4 in. long, thinly pubescent and bearing rufous bristly hairs. *Corolla* deep purple, about ·8 in. long, wing narrow oblong, lower half brown hairy, about 1·2 in. long; keel exceeding the wings and recurved at the apex. *Stamens* as long as the keel. *Pod* 2-3 in. long, linear-oblong; apex rounded, turgid, densely covered with dark brown bristles.

KHASI HILLS (1500 ft. C. B. Clarke. ASSAM—Griffith); MANIPUR—Neechugard.

Flrs. 2.

Closely allied to *M. bracteata* DC. differing by its rigid leaflets, more finely reticulate tertiary nerves and by its flowers and pods being more densely clothed with brown bristles.

5. Mucuna prurita Hk. Vern. *Akolshi*, Beng. The Cowitch or Cowage plant.

A twining annual very similar in appearance to the above. *Common petiole* 4-7 in. long. *Leaflets* 3-8 in. long,

ovate or rhomboid, glabrescent above, adpressedly grey-silky beneath. *Racemes* 4-8 in. long, short-peduncled, drooping, 10-20 flowered. *Calyx* .25-.4 in. long, 2-lipped with irritating bristles. *Corolla* 1.3-1.6 in. long, dark-purple; wings about .25 in. broad, shorter than the incurved keel. *Pod* 2-3 by .6-.8 in., 5-6 seeded, almost terete, ends curved in opposite directions, longitudinally ribbed, covered with dense pale-brown bristles.

Generally in scrub forests and waste lands in the plain.

The seeds are used as an aphrodisiac and the irritating hairs as a vermifuge.

Flrs. 1-3. Fr. 4-6.

18. ERYTHRINA Linn.

Generally trees with prickly branches. *Leaves* pinnately 3-foliolate; common petioles sometimes prickly; stipels gland-like. *Flowers* large, usually bright red, in long peduncled axillary or terminal racemes. *Calyx* oblique at the mouth, spathaceous or campanulate and 2-l labiate. *Corolla* much exserted; petals very unequal, the standard much exceeding the wings and the keel. *Stamens* 10, the upper stamen free or nearly so, other stamens free above, alternately long and short. *Ovary* stalked, many-ovuled; style incurved, not bearded. *Pod* linear, turgid, septate between the seeds, more or less torulose. *Seeds* ovoid-oblong without a strophiole.

- | | | | |
|-----|--|---------|----------------------------|
| I. | Calyx spathaceous, entire. Pod 2-3 seeded, scarcely torulose. Leaflets nearly as broad as long. | .. .. . | 1. <i>E. stricta</i> . |
| II. | Calyx campanulate and 2 labiate :— | | |
| | Standard as broad as long. Pod 6-8 seeded, distinctly torulose. Leaflets ovate-oblong. | .. .. . | 2. <i>E. ovalifolia</i> . |
| | Standard much longer than broad. Pod 4-6 seeded, flat and broad. Leaflets at least as broad as long. | .. .. . | 3. <i>E. arborescens</i> . |

1. *Erythrina stricta* Roxb. Vern. *Madar* or *Mandar*, Beng. & Ass.; *Tagat-asing*, Miri & Abor; *Pharse* or *Pharche-arong*, Mik.; *Bol-Madal* or *Mandal*, Garo; *Antu*, *Bag-long-thing*, *Kuong-cho-thing*, Kuki; *Mander-phang*, Cach.; *Dieng-song* or *R'song*, *Dieng-song'-dkhar*, Khasi; *Phartu*, Lush.; *Kung-choh*, Tipp.; *Phalita*, *Phalidha*, Nep.

A fairly large tree with a striking appearance when in flower. *Bark* deeply furrowed, greenish-yellow outside, often with strong prickles, inside white or dun-brown with white streaks; branchlets stout, glabrous, with many slightly incurved prickles; pith large, shoots pubescent when young. *Common petiole* 6-9 in. long, terete, not armed; stipules falcate. *Leaflets* 5-7 in. across, sometimes broader than long, rhomboid-orbicular or ovate, lateral oblique, all shortly acuminate, rather membranous, glabrous and shining above, glaucous and minutely pubescent along the nerves beneath; lateral nerves 6-8 on either half, the lowest basal, slightly arched, tertiary nerves rather irregular, transverse to the secondary with very fine reticulations between; base very broadly cuneate; lateral petiolules $\cdot 35\text{--}\cdot 5$ in. long, thicker than the petiole. *Racemes* 6-9 in. long, horizontal, secund, crowded at the ends of branchlets, pubescent when young; peduncles 5-7 in. long and $\cdot 2$ in. thick at the base; bracts caducous, up to 2 in. long, linear or subulate, brown pubescent. *Flowers* coral-red. *Calyx* spathaceous, about $\cdot 5$ in. long, pubescent in bud; standard scarlet, 1.5-2 in. by 1 in., ovate or obovate with parallel white lines inside; keel $\cdot 7\text{--}\cdot 9$ in. long, scarious, light greenish; wings minute, truncate, reddish. *Pod* 4-5 in. long, obscurely torulose, spindle-shaped, sharply pointed, glabrous outside, white silky inside. *Seeds* 2-3, kidney-shaped, red.

Fairly common throughout the province ascending to 3,500 ft. in the Hills.

Wood white, soft, very light, weighing about 16 lbs. per c. ft. It can however be used as planks, specially in carriage building.

Flrs. 1-3. Fr. 3-5.

2. *Erythrina ovalifolia* Roxb. Vern. *Hari-kekra*, Beng.

A small tree. *Branches* pale-grey, armed with numerous black prickles; bark thick, deeply cracked. *Common petiole* 2-4 in. long, terete, sometimes armed. *Leaflets* 3-9 by 1.5-5 in., ovate-oblong, subcoriaceous, glabrous above, glaucous beneath; lateral nerves 6-8 on either half, tertiaries indistinct; base broadly cuneate; lateral petiolules 1.5-1.7 in. long. *Racemes* terminal, 4-6 in. long, horizontal. *Flowers* scarlet,

1.5-1.7 in. long, mostly in groups of three on the rachis. *Calyx-tube* about .5 in. long, turbinate, bursting irregularly, brown-tomentose outside. *Standard* 1.5-2 by 1.5 in., obcordate, erect; keel .7-1 in. long; wings still shorter with coloured tips. *Pod* 3.5 in. long, 6-8 seeded, constricted between the seeds along the upper suture; seeds black, kidney-shaped, about .5 by .25 in.

Said to occur in SYLHET and ASSAM PROPER.

Flrs. 1-3. Fr. 4-6.

Erythrina arborescens Roxb. Vern. *Dieng-son*, *Dieng-song*, *Dieng-ja-ra-song*, *Dieng-r-song-hadem*, Synt.; *Dieng-song*, Khasi.

A small tree with a low spreading crown. *Bark* rough, with a shining layer of cork outside, bright-green underneath the cork, inside pale white. *Common petiole* 8-10 in. long, stout, terete, glabrous. *Leaflets* 5-7 in. long and as broad and often broader, broadly triangular-ovoid or rhomboid with a cuneate base, sharply acuminate, membranous, bright green shining and quite glabrous above, subglaucous and slightly hispidulous along the nerves beneath; lateral nerves 5-7 on either half, nearly straight, tertiaries transverse to the secondaries, reticulations very fine; lateral petiolules about .5 in. long, stout. *Racemes* axillary, 8-10 in. long, long-peduncled, pubescent when young; pedicels slender up to .2 in. long. *Calyx* silky or nearly glabrate outside. *Standard* orange-red, 1.5 by 1 in., elliptic, concave, emarginate, veined, velvety inside; wings pale-green, lineate, .5 in. long, ovate; keel triangular ovate, acuminate, .7 in. long, pale-green. *Pod* much curved, 6-9 by 1 in., narrowed at both ends, 4-6 seeded. *Seeds* about .5 in. long, oblong-reniform, white (at least when not fully ripe); testa smooth.

KHASI HILLS 4,500-6,000 ft., often planted.

Wood as of *E. stricta*.

Flrs. 8-9. Fr. 10-11.

19. BUTEA Roxb.

Trees or shrubs, the latter erect or climbing. *Leaves* pinnately 3-foliate (very rarely 1-foliate in *B. frondosa*);

stipules small, caducous. *Leaflets* large; stipels serrulate. *Flowers* large, showy, fascicled in axillary or terminal, simple or compound racemes; bracts and bracteoles small, caducous. *Calyx* campanulate; teeth deltoid, the two upper connate. *Corolla* much exserted; petals subequal or unequal, generally orange-red; standard ovate or lanceolate, recurved; wings falcate, adnate to the keel. *Stamens* diadelphous, anthers uniform. *Ovary* sessile or shortly stalked, 2-ovuled; style filiform, curved, beardless. *Pod* oblong, flat, with only one seed at the apex and dehiscent only above the seed. *Seed* obovate, compressed; hilum small.

- I. Flowers at least 2 in. long; keel much incurved, acute. Pod stalked :—
 - A middle-sized tree. Lower calyx-teeth deltoid; pod grey-tomentose. 1. *B. frondosa*.
 - A large climber. Lower calyx-teeth lanceolate; pod rusty-tomentose. 2. *B. superba*.
- II. Flowers about 1 in. long; keel slightly curved, obtuse. A sub-erect shrub. Pod sessile. 3. *B. minor*.

1. *Butea frondosa* Roxb. Vern. *Polah*, *Polak*, Ass.; *Palas*, Beng.; *Bol-ori*, or *-uri*, *Bol-aphal-uri*, Garo; *Dhak*, Hind.; *Kinsuka*, *Palasa*, Sans. Flame of the forest.

A tree up to 50 ft. in height and 6 ft. in girth; young parts softly silky, often gnarled; bark rough, bluish-grey or dark-brown outside, fibrous and light red inside, exuding from wounds a light red gum which dries to ruby-coloured beads. *Common petiole* 5-9 in. long; stipules short, tomentose. *Leaflets* 5-8 by 4-5-7 in., hard, rigidly coriaceous, glabrescent and somewhat shining above, silky tomentose beneath, lateral obliquely ovate or broad elliptic; terminal rhomboid or broadly obovate from a cuneate base; lateral nerves 4-7 on either half, slightly arched, very prominent beneath, petiolules .2-.4 in. long, stout. *Racemes* axillary, crowded towards the extremities of leafless branchlets, 4-6 in. long, rigid, often subcorymbose; pedicels .5-1.3 in. long, the stout rachis and bracts and calyx covered with dark chocolate or brown velvety tomentum. *Calyx* .5 in. long, cup-shaped, fleshy, grey-silky inside. *Petals* bright orange-red, equal, silvery tomentose outside; standard 1 in. broad,

recurved; keel incurved, beaked; wings falcate, adhering to the keel. *Ovary* shortly stalked. *Pod* 4-6 by 1·2-1·7 in., ligulate, firm, pendulous, silky tomentose, more densely so along the sutures, abruptly narrowed to a stalk, ·5-·7 in. long. *Seed* 1·2-1·5 in. long, oval, compressed, dark-brown.

Plains of Assam up to SIBSAGAR, generally in water-logged localities,—not reported from LAKHIMPUR. Also in the GARO HILLS up to 1,000 ft.

The wood is dirty white, porous, soft, weighing 36 lbs. per c. ft. It is durable under water and is used for well-curbs and piles. The red juice which hardens into a ruby coloured gum is used as a substitute for Kino. The flowers give an orange dye and a decoction of them is used to keep out white ants from fields. The seeds have a medicinal use. Lac is often grown on the branches. The leaves are used as plates like those of *Sal*, and to wrap up grocers parcels. They are also lopped for buffalo fodder.

Leafless 2-3. Flrs. 3-4. New leaves 4. Fr. 6-7.

2. *Butea superba* Roxb. Vern. *Lata-palash*, Beng.

A large woody dextrorse climber with fairly smooth brownish bark, exuding a red juice like the preceding species and closely resembling it in foliage and flowers. *Leaflets* usually much larger, sometimes attaining over 18 in. in young plants, the racemes much longer, thinner and more flexuous and the flowers larger and of a brighter yellow but with a smaller calyx than in *B. frondosa*. *Pod* somewhat shorter, but longer stalked, not so broad, somewhat rigid, densely rusty tomentose.

Only found in the drier parts of *Sal* areas in GOALPARA.

The gum, the leaves and the flowers can respectively be put to the same uses as those of *B. frondosa*.

Flrs. 3-4. Fr. 4-6.

3. *Butea minor* Ham. Vern. *Dieng-la-palang*, Khasi and Synt.

An erect shrub with long switchy branches covered with grey-silky tomentum. *Common petiole* 4-8 in. long, channelled, tomentose; stipules about 1 in. broad, semicircular, often persistent. *Leaflets* often up to 15 by 12 in., more or less of the same shape as, but somewhat less coriaceous than of the other two species, glabrate above, bright grey-silky beneath; lateral nerves 7-9 on either half, very oblique. *Racemes*

4-12 in. long, erect, angular, often with short branches at the base; pedicels .5-.7 in. long, terete, tomentose. *Flowers* .8-1 in. long, red. *Calyx* about .3 in. long, silky tomentose; teeth short, acute. *Corolla* densely velvety; standard .5 in. broad; wings .5-.6 in. long, very slightly falcate, shorter than the slightly inflexed keel. *Style* hairy. *Pod* 3-3.5 in. long, rigid, sessile, cuneate at the base, rusty-tomentose.

KHASI HILLS, 3-5,000 ft. in open grass-lands, specially in the Jowai Sub-division where the leaves are used for wrapping parcels.

Flrs. 8-10. Fr. 10-12.

20. SPATHOLOBUS Hassk.

Spatholobus Roxburghii Benth. Syn. *Butea parviflora* Roxb. Vern. *Sallata*, *Hallot*, *Mal-leo*, *Maru* or *Mari-lewa*, *Panlota*, *Hati-bandhalata*, Ass. (Kam.); *Gobang-lata*, Ass. (Darrang); *Salmama*, Beng & Mech.; *Jermei* or *Ther-la-moh-dak*, Khasi; *Mari*, *Maru*, *Mauri*, Garo; *Dumori* or *Dumri-doukha*, *Tou-mudru*, *Salmama*, Cach.; *Chichipia-ringkhong*, Mikir; *Jong-obi*, Tipp.; *Ngoi-hrui*, Lush.; *Maloi-lewa*, Jharua, *Debre-lawar*, Nep.; *Jema-soi-sen*, Kuki.

A large sinistrorse evergreen climber; stem with concentric layers of bast inside which exude a red gum when cut; branches grey-pubescent. *Leaves* pinnately trifoliolate, stipellate. *Common petiole* 3-4 in. long, terete or only slightly channelled above, glabrescent; stipules deciduous, triangular-acute, .3 in. long. *Leaflets* 4-9 by 3-6 in., ovate to rhomboid or obovate, lateral very oblique, shortly acuminate, acute or obtuse, subcoriaceous, glabrous above, more or less pubescent beneath; lateral nerves 7-10 on either half, slightly arched, uppermost meeting near the margin in loops; tertiaries transverse and parallel; petiolules .2-.3 in. long; stipels setaceous. *Racemes* compound, forming large terminal panicles, 2-3 ft. long, lower portion often leafy. *Flowers* white, cream-coloured or reddish, .3-.4 in. long, solitary or in fascicles of 2-3; pedicels very short; bracts minute, linear, caducous. *Calyx* campanulate, grey-velvety; teeth acute, the two upper connate. *Petals* subequal; standard longer than the keel, emarginate; wings free; keel obtuse, nearly straight. *Stamens* 2-adelphous. *Ovary* shortly stalked, 2-ovuled; style

incurved, beardless; stigma capitate. *Pod* 3-6 by $\cdot 6\text{--}1\cdot 6$ in., 1-seeded, generally more or less constricted and flat below the seed, narrowed at the base into a stalk, $\cdot 4\text{--}6$ in. long, softly brown-velvety, dehiscing from the apex only sufficiently to set free the seed.

Except above a line drawn across the Brahmaputra Valley through Dhansirimukh common throughout the PROVINCE, generally in deciduous types of forest. Always present with Sal to which it does considerable harm by bending and distorting its stem round which it twines with a very tight grip.

Dry stems are often used as tinder.

Flrs. 8-12. Fr. 1-3.

21. MASTERSIA Benth.

Mastersia assamica Benth. Syn. *M. cleistocarpa* Baker.
Vern. *Tille-iyndru*, Synt.

A stout woody climber; branches sarmentose, terete, glabrous, lenticelled, twining anti-clockwise. *Leaves* pinnately 3-foliolate; *common petiole* $3\cdot 5\text{--}5$ in. long; stipules broader at the base than long. *Leaflets* 4-6 by 3-4 in., ovate or obovate, tapering acuminate, the lateral oblique, chartaceous, glabrous above, minutely adpressed pubescent beneath; lateral nerves 9-10 on either half, oblique, slightly arched, tertiary subparallel, transverse to the secondaries; base rounded or subcordate; stipels about $\cdot 25$ in. long, subulate. *Racemes* generally terminal and paniced, 12-18 in. long; nodes tumid; flowers germinate, conspicuously bracteolate. *Calyx-tube* $\cdot 5$ in. long, turbinate; teeth long, the two upper connate. *Corolla* bluish-white, only slightly exerted; standard suborbicular; keel obtuse, almost straight. *Stamens* 2-adelphous. *Ovary* sessile, many-ovuled; style short, filiform, incurved. *Pod* 3-5 by $1\cdot 1\text{--}25$ in., very flat, strap-shaped, septate between the seeds, the dorsal suture bordered by an erect sharp wing, $\cdot 1\text{--}15$ in. broad, indehiscent or tardily dehiscent. *Seeds* oblong, 15-20 or more, black, shining, $\cdot 15\text{--}2$ by $\cdot 1$ in. on long filiform funicles.

Evergreen forests in UPPER ASSAM, e.g., Kalioni in SIBSAGAR, Dulong Valley, N. Lakhimpur, etc., also in the KHASI HILLS, 4,500 ft. and in the Borail Reserve, NORTH CACHAR HILLS.

Flrs. 10-11. Fr. 12-1.

22. CANAVALIA DC.

Canavalia ensiformis DC. Vern. *Kamtal-urahi*, Ass.; *Makhan-sim*, Beng.; *Naga-thepak-rikang*, *Thepa*, Mik.; *Inam-athepa-arong*, Mik. (Barnihat); *Heppua-teipi*, Naga. The Sword Bean.

A fairly large perennial climber; branchlets glabrous, twining from right to left. *Leaves* pinnately 3-foliolate; common petiole 3·5-5·5 in. long, shallowly channelled; base swollen; stipules minute, deciduous. *Leaflets* 4-7 by 3·5-5 in., ovate to rhomboid-elliptic, terminal usually largest, lateral somewhat oblique, acute or shortly acuminate, minutely cuspidate, broadly cuneate at the base, membranous, glabrous but more or less scaberulous, specially on the upper surface; lateral nerves 6 or 7 on either half, slender, arched; petiolules ·25-·4 in.; stipels setaceous. *Racemes* axillary, 5-6 in. long on stout terete peduncles, 6-8 in. long; nodes tumid, thinly pubescent. *Flowers* large, white, usually with a dash of pink or purple, solitary or in pairs; pedicels short, reflexed, woody in fruit. *Calyx* ·5-·6 in. long, 2-lipped, upper lip notched, lower 3-lobed, sparsely adpressed pubescent to glabrescent outside, silky, specially at the throat inside; lobes much shorter than the tube, upper largest. *Corolla* 1·2-2 in. long, exserted; petals all clawed and auricled at the base; standard suborbicular, rather broader than long, slightly exceeding the wings and the keel often with two ridge-like callosities above the auricles; keel incurved, obtuse. *Stamens* monadelphous. *Ovary* silky, many-ovuled; style incurved, beardless; ovules 10 or more. *Pod* 8-10 by 1·3-1 in. (in cultivation much longer), flat but with two prominent longitudinal ridges along the upper suture, with a slight serpentine curvature along its vertical plane. *Seeds* 6-10, about 1 in. diam., compressed, pink or white when fully ripe.

UPPER ASSAM, SIBSAGAR, Silghat, etc., cultivated in SYLHET. The tender pods are used as a vegetable and the seeds as a pulse.

Flrs. & Fr. 8-12.

Var. *virosa* Vern. *Kathsim*, Beng., differs by its smaller leaves which are more persistently hairy on the undersurface, hairy petioles, smaller lilac flowers borne on denser and shorter racemes and much smaller pods (3-6 in. long) and less compressed marbled seeds. The pods are not edible and the seeds are said to be poisonous.

23. DIOCLEA H. B. K.**Dioclea javanica** Benth. Syn. *D. reflexa* Hk. f.

A slender woody climber; branchlets terete, pubescent when young. *Leaves* pinnately 3-foliolate. *Leaflets* 3-4 by 1·5-3 in., ovate or elliptic, acute or shortly acuminate, entire, coriaceous, thinly adpressed hairy above, more densely and more softly hairy beneath; lateral nerves 8-10 on either side of the midrib, arched, prominent beneath; base rounded; lateral petiolules ·15-·2 in. long, stipellate. *Racemes* 12-18 in. long, long-peduncled, subspicate, thickened at the nodes; bracts ·5 in. long, linear, reflexed, silky, caducous. *Clayx-tube* ·3-·5 in. long, bracteolate, trubinate; teeth as long as the tube. *Corolla* ·7-·9 in. long, bluish-white or reddish; standard orbicular or ovate, reflexed, auricled at the base; keel free, incurved, not beaked. *Stamens* 10, monadelphous, the uppermost free at the base. *Ovary* subsessile, 2-3 ovuled; style incurved, beardless. *Pod* 3-4 by 2 in., half-moon-shaped, 2-seeded, wrinkled outside over the seeds, not septate, covered with short brown hairs; lower suture sharp, upper about ·5 in. broad. *Seeds* somewhat compressed.

Forests of SYLHET, Hk. f. & Th.

Flrs. 12-1. Fr. 2-3.

24. PUERARIA DC.

Twining or diffuse shrubs or herbs. *Leaves* pinnately 3-foliolate; stipules herbaceous, sometimes fixed by the centre; leaflets sometimes palmately lobed; stipels subulate. *Racemes* long usually, axillary when simple and terminal when compound. *Flowers* bluish to reddish, generally ternate on the node of the rachis; bracts and bracteoles small, caducous. *Calyx* campanulate; teeth long or short, the two upper connate. *Corolla* exserted; petals subequal; standard usually spurred at the base; wings narrow, often falcate, adnate to the straight or incurved keel. *Stamens* 10, monadelphous, the odd filament being usually coherent with others at the middle to form a tube, rarely 2-adelphous; anthers uniform. *Ovary* sessile or shortly stalked, many-ovuled; style long, filiform, much incurved, beardless; stigma globose. *Pod* linear, flattish, glabrous or hairy. *Seeds* transversely oblong.

- I. Flowers bluish appearing before the leaves.
Pod flat, membranous, constricted between the seeds :—
Leaflets not lobed; pod bristly; climbing shrub. 1. *P. tuberosa*.
- II. Flowers reddish or red-tipped, appearing with the leaves. Pod not constricted between the seeds :—
 - A. Leaflets not lobed :—
 1. Pods glabrous. Stipules basifixed :—
Pod membranous, flexible. Pedicels longer than calyx; herbaceous climber. 2. *P. peduncularis*.
Pod coriaceous, rigid. Pedicels not exceeding the calyx. Subscandent shrub. 3. *P. Wallichii*.
 2. Pod shaggy. Stipules fixed by the midrib. Climbing shrub. 4. *P. Thunbergiana*.
 - B. Leaflets more or less lobed :—
Stipules basifixed. Pods glabrescent, rigid. Climbing annuals :—
Leaflets shallow-lobed. Flowers .5-.75 in. long. Pod cylindrical with unthickened sutures. 5. *P. phaseoloides*.
Leaflets deeply lobed. Flowers 1 in. long. Pod broader than thick, with thickened sutures. 6. *P. subspicata*.

1. *Pueraria tuberosa* DC.

A large woody climber with very large tuberous roots*, flowering when leafless; old stem with grey fibrous bark; branchlets grey velvety. *Common petiole* 5-8 in. long; stipules minute, cordate-ovate, deciduous. *Leaflets* 4-8 by 3-6 in., terminal broad-ovate or rhomboid, lateral oblique-ovate, all acuminate, membranous, silky-pubescent when young, glabrescent above and thinly adpressed pubescent beneath when mature; main lateral nerves 6-8 on either half; the basal pair being opposite and stronger than the others; base truncate or obtusely cuneate, 3-5 nerved; lateral petiolules .2-.3 in. long; stipels .2-.3 in. long, lanceolate-subulate. *Racemes* erect, usually paniced and terminal or from axils of fallen leaves, 6-15 in. long,

* Sometimes attaining 1-2 ft. in length and 10-12 in. in diameter, and often several strings of tubers connected by thin roots are developed from the same plant.

grey or brown pubescent; bracts minute. *Calyx* about $\cdot 2\cdot 3$ in. long, densely grey-silky; teeth triangular, shorter than the tube, ciliate on the margins. *Corolla* bright-blue, fading to bluish purple, $\cdot 4\cdot 5$ in. long; standard often light in colour with a pale yellow central spot, orbicular, emarginate, clawed, generally spurred; wings oblong-falcate, minutely spurred above the base; keel obtuse, nearly straight. *Stamens* usually 2-adelphous. *Pod* 2-3 in. long, flat, flexible, 3-6 seeded, constricted between the seeds with long bristle-like brown silky hairs.

Not uncommon in deciduous scrubs where the rainfall is not above 50 in. e.g. Upper reaches of the Nambor Valley and SUB-HIMALAYAN TRACTS in KAMRUP and E. GOALPARA.

The tubers have a liquorice like taste and are eaten raw, also used in medicine.

Leafless 12-5. Flrs. 3-4. Fr. 5-6 to 11-12 (?).

2. *Pueraria peduncularis* Grah. Vern. *Ting-khla*, Khasi.

An extensive twining herb; branchlets thin, clothed with short, weak, deflexed grey hairs. *Common petiole* 2-4-5 in. long, clothed like the branchlets; stipules basifixed, $\cdot 25$ in. long, lanceolate, shaggy. *Leaflets* 4-6 by 3-5 in. ovate, ovate-rhomboid, lateral oblique, membranous, green and subscabrous above, grey and softly pubescent beneath; petiolules short, hairy; stipels subulate. *Racemes* 6-12 in. long, slender, rachis downy, unbranched; peduncle 2-5 in. long; pedicels filiform, $\cdot 1\cdot 25$ in. long, fascicled; bracts subulate, adpressed silky, shorter than the pedicels. *Calyx* $\cdot 12\cdot 2$ in. long, slightly gibbous, densely hairy outside. *Corolla* $\cdot 5$ in. long, red or purple tipped; standard not spurred. *Upper stamen* usually free. *Pod* 2-3 by $\cdot 25$ in., membranous, glabrous, 4-8 seeded.

KHASI HILLS, e.g., the Kyllong Rock and such other places.

Flrs. 9-10. Fr. cold season.

3. *Pueraria Wallichii* DC. Vern. *Mei-soh-ktaw*, Khasi.

A semi-scandent shrub with glabrous terete branches. *Common petiole* 3-4 in. long, slender, glabrous or glabrate; stipules basifixed. *Leaflets* 2-5-6 by 1-5-3-5 in., lateral

obliquely ovate, terminal elliptic or subrhomboid, acuminate, membranous, glabrescent but more or less scabrous and green, sparsely adpressed pubescent and pale beneath; lateral nerves 6-8, arcuate, lowest pair basal, tertiaries subparallel; petiolules $\cdot 2 \cdot 25$ in. long, pubescent. *Racemes* 4-8 in. long, short-peduncled, dense flowered, puberulous or glabrate; bracts subulate, $\cdot 25$ in. long; pedicels $\cdot 06 \cdot 1$ in. long, fascicled, minutely bracteolate near the upper extremity. *Calyx* $\cdot 15$ in. long, slightly gibbous, shallowly toothed, thinly pubescent. *Corolla* pink or brick-red or white tipped with red, $\cdot 5 \cdot 8$ in. long; standard rounded, not spurred, white veined inside. *Stamens* 2-adelphous. *Pod* glabrous, straight, flat, rigid, coriaceous, strap-shaped, 8-10 seeded, slightly thickened and obscurely repand at the sutures. *Seeds* dark-brown, reniform, glabrous.

KHASI and JAINTIA HILLS between 2,500 and 5,000 ft.

Flrs. & Fr. 8-11.

4. *Pueraria Thunbergiana* Benth. Syn. *P. Thomsoni* Benth. Vern. *Suting*, *Suting-rit*, Khasi.

A large climbing shrub; branches slender, clothed with fine deflexed brownish hairs. *Common petiole* 4-6 in. long, brown-pilose; stipules 1 in. long, fixed by the middle, membranous, brown velvety. *Leaflets* 5-7 by 4-6 in., rotundorhomboid to ovate, lateral oblique, sharply acuminate, membranous, dark-green and nearly glabrous above and grey and thinly covered with very short adpressed hairs beneath when mature; lateral nerves 5-7 on either half, lowest pair basal; base subcuneate or rounded; petiolules upto $\cdot 2$ in. long; stipels linear or subulate, $\cdot 5 \cdot 7$ in. long. *Racemes* simple, 8-15 in. long, dense-flowered towards the extremity; rachis stout, pubescent; bracts paired, about $\cdot 3$ in. long, lanceolate, pubescent; pedicels very short, elongating in fruit, each with a pair of lanceolate adpressed pubescent bracteoles, $\cdot 1 \cdot 15$ in. long at the top. *Calyx* $\cdot 5 \cdot 6$ in. long, deeply divided into lanceolate teeth, $\cdot 3 \cdot 45$ in. long, silky pubescent outside. *Corolla* purple or reddish, 1 in. long, sweet scented; standard sub-orbicular, $\cdot 5 \cdot 65$ in. across, emarginate, distinctly spurred. *Vexillary stamen* free. *Pod* 4-5 by $\cdot 35 \cdot 5$ in., flat, straight, 8-16 seeded, densely covered with patent rusty hairs.

KHASI HILLS, 4-5,500 ft.

Cattle and buffaloes browse on the leaves.

Flrs. 8-9. Fr. 9-10.

5. *Pueraria phaseoloides* Benth. Vern. *Jermei-kyn-saw*, Synt.; *Jermei-soh-gonsoh*, Khasi.

A twining annual, often trailing on sandy beds of streams; young shoots covered with patent brown hairs. *Common petiole* 2-4 in. long, covered with ascending hairs; stipules basifixed, lanceolate, closely ribbed, strongly ciliate with long brown hairs. *Leaflets* 2-5 in. long and almost as broad, sub-rhomboid to broad ovate, lateral oblique, obtuse or acute, very shallowly lobed or sometimes not lobed at all, membranous, green above, grey or glaucous and somewhat satiny beneath, adpressed hairy on both surfaces; lateral nerves 3-5, almost straight; lowest pair basal; lateral petioles .15-.2 in. long; stipels setaceous. *Racemes* simple, 4-9 in. long, long-peduncled; pedicels about .15 in. long, slender; bracts and bracteoles lanceolate, closely ribbed, ciliate. *Calyx* .3-.4 in. long, adpressed hairy outside; teeth terminating in bristles. *Corolla* pale blue or reddish upto .75 in. long. *Vexillary stamen* generally free. *Pod* 3-5 by .15 in., reflexed, linear, sub-terete, straight, black when mature, thinly clothed with stiff adpressed hairs, 10-20 seeded; sutures not thickened. *Seeds* black, tranversely oblong.

In open evergreen forests in the SURMA VALLEY, e.g., Badarpur, Isamati, etc. KHASI HILLS up to 4,000 ft. e.g., Shangpung (Jowai Sub-Division); also in GOALPARA.

A useful strong white fibre is extracted from the stem and switchy branches, which is made into twines or ropes.

Flrs. 9-10. Fr. 10-11.

6. *Pueraria subspicata* Benth.

Very similar to the preceding species with more deeply lobed somewhat larger and harsher leaflets, larger flowers, and less cylindrical pods with thickened sutures. The fibre is probably equally good.

Flrs. 9-10. Fr. 10-11.

25. PHASEOLUS Linn.**Phaseolus calcaratus** Roxb. Vern. *Rumbai*, Khasi.

A twining herb; stem covered with spreading grey hairs. *Leaves* 3-foliolate; common petiole 5-6 in. long; stipules adpressed, .2-.3 in. long, subfalcately lanceolate. *Leaflets* 1.5-3.5 by .8-2 in., rhomboid-ovate, often obscurely lobed, tapering acuminate, cuneate at the base, membranous, sparsely hirsute or glabrescent; lateral nerves about 5 on either side of the midrib, the lowest pair basal; stipels setaceous, about .15 in. long. *Racemes* 3-5 in. long, elongate, 10-20 flowered; bracts lanceolate and subfalcate, about .2 in. long; bracteoles about .1 in. long, linear, caducous. *Calyx* cup-shaped, about .1 in. long, membranous; teeth triangular, shorter than the tube. *Corolla* .5 in. long, pale-yellow, the keel terminating in a twisted beak. *Stamens* diadelphous. *Ovary* sessile, many-ovuled; style filiform, twisted with the keel, bearded; stigma oblique. *Pod* 2-3 by .2 in., slightly compressed, 8-12 seeded, septate between the seeds, slightly scabrous when young. *Seeds* .2 by .15 in., oblong, brown, smooth.

KHASI HILLS up to 5,000 ft., where it is truly wild, possibly also in the plains. It is cultivated in other Provinces for the sake of the seeds which are used as a pulse.

Flrs. 8-9. Fr. 10-11.

26. DYSOLOBIUM Prain.

Dysolobium grande Prain. Syn. *Phaseolus velutinus* Grah. Vern. *Bahdar-kakua* (?), Ass. (Nowg.); *Makai-phok*, Garo.

A large woody climber; branches terete, minutely pubescent. *Leaves* pinnately 3-foliolate; rachis 5-9 in. long; stipules lanceolate, .3-.5 in. long. *Leaflets* 5-9 by 4-6 in., broadly subrhomboid-ovate or sub-orbicular, lateral oblique, cuspidate-acuminate, chartaceous, green and glabrescent above, pale and more or less scabrid along the nerves beneath, specially when young; base rounded or broadly cuneate; lateral nerves on either side of the midrib; petiolules .2-.25 in. long; stipels terminal, setaceous, lateral subulate and longer. *Racemes* 12-20 in. long including the peduncle, which is 9-15 in. long, 8-12 flowered; pedicels up to .15 in.; bracteoles small,

broad, adpressed to the calyx. *Calyx* about .5 in. long, silky; upper four teeth triangular obtuse; lowermost longest and lanceolate, all shorter than the tube. *Corolla* about 1.5 in. long, reddish; standard 1 in. broad; keel with a long lateral depressed beak. *Stamens* 2-adelphous (9+1). *Ovary* sessile, many-ovuled; style filiform, bearded. *Pod* 5-8 in. long and about .7 in. across in the middle, stout, sub-cylindric, pointed at both ends, deeply longitudinally channelled along sutures, woody, densely brown-velvety outside, septate between the seeds. *Seeds* 8-12, of which however usually not more than half fully developed, with a reticulately hirsute testa.

Plains of the BRAHMAPUTRA VALLEY also up to 2,000 ft. in the KHASI and GARO HILLS, often with a tendency to be gregarious.

Flrs. rainy season. Fr. 11-3.

27. VIGNA Savi.

***Vigna vexillata* Benth.** Vern. *Jermei-soh-lang-tor*, Khasi.

A slender twiner with fusiform tuberous roots; stem terete, more or less scabrid with deflexed hairs. *Leaves* 3-foliolate; common petiole 2-3 in. long, hairy; stipules .15-.25 in. long, basifixed, lanceolate, strongly ribbed. *Leaflets* 3-5 by .5-1.5 in., narrowly lanceolate, less-often ovate-lanceolate, finely acuminate, more or less rounded or truncate at the base, membranous, dark-green above, scabrid with adpressed hairs on both surfaces; lateral nerves about 4 on either side of the midrib, lowest pair basal or sub-basal, oblique, arched, reticulations close and fine; lateral petiolules .1-.15 in. long, shaggy with rusty hairs; stipellæ minute, setaceous. *Peduncles* 3-10 in. long, tapering, hirsute with reflexed hairs. *Flowers* so congested at the end of the peduncle as to appear to be in heads. *Calyx* about .5 in. long, sub-campanulate with long hairy teeth. *Corolla* purple, very finely veined with deeper purple, 1-1.5 in. long; standard as broad as long; keel beaked. *Style* filiform, bearded along the inner margin. *Pod* 3-4 by .25 in., slightly compressed, scabrid with dark-brown bristly hairs, 15-20-seeded; seeds dark-brown or almost black, broader than long.

KHASI HILLS 3-5,000 ft., e.g., Nongstoin, Umran, etc.

The seeds are used as a pulse and the tuberous roots are eaten.
Flrs. 8-9. Fr. 9-10.

Vigna Catiang Endl. Vern. *Urhi-mah*, Ass.; *Barbati*, Beng.—is cultivated in kitchen gardens. The tender pods are used as a vegetable and the seeds as a pulse. A green dye is obtained from the leaves.

28. DOLICHOS Linn.

Twining herbs with stipellate trifoliolate leaves. *Flowers* in axillary racemes or in axillary fascicles of 2-3 or solitary; bracts and bracteoles minute, *Calyx-tube* campanulate. *Corolla* much exserted; standard orbicular, auricled at the base; wings oblong obovate, slightly adnate to the keel; keel incurved, not twisted. *Stamens* 2-adelphous. *Ovary* subsessile; style thickened upwards and bearded along the inner face or filiform and bearded only round the stigma. *Pod* flat, linear to linear-oblong, recurved. *Seeds* large, thick.

I. Style filiform, hairy round the stigma :—

Root tuberous. Flowers pink or purple on slender bracteate peduncles. Calyx glabrous. Pod 6-8 seeded.

1. *D. falcatus*.

Root annual. Flowers yellow, 1-3 together from the axils, not racemed.

Calyx downy. Pod 5-6 seeded.

D. biflorus.

II. Style thickened upwards, bearded on the inner face. Flowers on elongate racemes.

2. *D. Lablab*.

1. *Dolichos falcatus* Klein.

A slender perennial twiner with tuberous roots; stem at first pilose, glabrescent afterwards; stipules small, persistent. *Leaflets* 1-3 in. long, ovate, often slightly 3-lobed, pilose or glabrescent. *Flowers* 2-8 on an axillary peduncle up to 2 in. long; pedicels very short. *Calyx* glabrous; teeth deltoid. *Corolla* pink or purple, about .5 in. long; keel obtuse. *Pod* 2-3 by .35 in., linear, glabrous, with 6-8 kidney-shaped seeds.

Said to occur in the KHASI HILLS up to 6,000 ft.

Flrs. & Fr. 11-12.

Dolichos biflorus Linn. Vern. *Kulthi*, *Kurthi*, Beng.; *Kulthi-Mah*, Ass.; The 'Horse Gram' of Madras.

An annual suberect or twining plant with hairy stem; stipules scarious. *Leaflets* 1-2 in. long, ovate, acute, not lobed, membranous, pilose. *Flowers* pale yellow, 1-3 independently from the axils of the leaves without a common peduncle. *Calyx* downy; teeth elongate, exceeding the tube. *Corolla* about .5 in. long; standard with a

crimson spot; keel obtuse, shorter than the standard. *Pod* 1-2 by $\cdot 25 \cdot 3$ in., adpressed hairy. *Seeds* 4-6, reniform, grey or blackish.

Believed to occur in Assam. Much cultivated in Chota Nagpur and Madras both for the pulse and the straw which is an excellent fodder.

Flrs. 9-11. Fr. 10-12.

2. Dolichos Lablab Linn. Vern. *Urohi*, Ass.; *Shim*, Sim, Beng.

A large climber generally with sarmentose branches. *Stipules* basifixed. *Leaflets* 2-6 in. long, broadly ovate or rhomboid, shortly acuminate, lateral oblique; base cuneate, strongly 3-5 nerved. *Peduncles* 3-9 in. long, axillary or terminal, with tumid nodes; pedicels fascicled, $\cdot 15 \cdot 25$ in. long; bracteoles oblong. *Calyx* $\cdot 25$ in. long, campanulate. *Corolla* red, purple or white; standard up to $\cdot 75$ in. in breadth; keel beaked. *Style* thickened upwards, bearded down the inner face. *Pods* white, pink or purplish, 3-6 by $\cdot 5 \cdot 1 \cdot 5$ in. flat, valves tight, -(in var. *lignosus* green sub-cylindrical and torulose valves loose). *Seeds* large, oval, reddish or black.

This is represented by a large number of cultivated varieties chiefly grown in village kitchen gardens.

Fl. & Fr. 10-2.

29. CLITORIA Linn.

Clitoria mariana Linn.

A scandent undershrub with thin terete branches. *Leaves* imparipinnate, usually 3-foliolate. *Common petiole* $1 \cdot 5 \cdot 3$ in. long, slender, glabrous; *stipules* lanceolate, $\cdot 15 \cdot 3$ in. long, closely parallel nerved. *Leaflets* $1 \cdot 5 \cdot 4$ by $\cdot 6 \cdot 1 \cdot 6$ in., ovate elliptic or lanceolate, more or less acute or shortly acuminate, mucronate, chartaceous, glabrous, green above, pale beneath; lateral nerves 10-12 on either side, anastomosing near the margin, prominent beneath; base rounded or subacute; lateral petiolules $\cdot 1 \cdot 15$ in. long; stipels setaceous to subulate about $\cdot 1 \cdot 2$ in. long. *Peduncles* axillary, $\cdot 5 \cdot 2$ in. long, slender, glabrous, usually 2-flowered, with a pair of small bracts at the apex, $\cdot 1 \cdot 2$ in. long; bracteoles two to each flower, about $\cdot 2$ in. long, elliptic or oblong, acute, membranous. *Calyx*

·6·8 in. long, tubular, membranous, glabrous; lobes ·2·25 in. long, lanceolate. *Petals* whitish or pale blue, glabrous; standard 1·5-2 by 1·1·3 in., much exceeding the other petals. *Stamens* 1-adelphous, the vexillary one being absent. *Ovary* stalked, many ovuled; style compressed, incurved, bearded along the inner side. *Pod* 1·1·5 in. long, 1-3 seeded, glabrous, septate and adpressed on the sides between the seeds crowned with the long persistent style and seated on the marcescent calyx. *Seeds* about ·25 by ·12 in., transversely oblong, dark-brown.

KHASI HILLS, 5-6,000 ft. Deserves to be cultivated for its handsome flowers.

Flrs. 7-8. Fr. 9-10.

Clitoria ternatea Linn. Vern. *Aparajita*, Beng. which has white or blue flowers, the latter often double, is cultivated in gardens in the plains towns and villages. It differs by having shorter petioles, 5-7 leaflets, solitary flowers on shorter peduncles and longer pods with 5-10 seeds. Its seeds and root-bark have medicinal properties.

30. FLEMINGIA Roxb.

Shrubs or undershrubs, rarely erect or trailing herbs. *Leaves* digitately 3-foliolate or simple, gland-dotted beneath, sometimes also above; stipules usually scarious with fine parallel veins. *Flowers* in axillary or terminal simple or compound racemes, rarely in cymes or heads, sometimes with large conduplicate bracts; bracteoles minute or 0. *Calyx-tube* narrow. *Corolla* more or less exserted; standard auricled at base; wings obliquely oblong or obovate, adnate to the slightly beaked keel. *Stamens* 2-adelphous (9+1); anthers uniform. *Ovary* subsessile, 2-ovuled; style beardless; stigma capitate. *Pod* obliquely oblong, inflated, continuous within, 2-seeded; seeds orbicular, attached to the funicle at the centre.

I. Leaves 1 foliolate :—

Flowers in cymose clusters arranged in racemes, cymes hidden by a pair of large persistent membranous conduplicate bracts.

1. *F. strobilifera*.

II. Leaves 3 foliolate :—

A. Flowers in racemes :—

1. Flowers not small; racemes spike-like; bracts not conduplicate :—

- a. Branches sharply angled; stipules over 2 in. long, rigid; bracts large, exceeding the flowers. 2. *F. stricta*.
- b. Branches not sharply angled or subterete; bracts small not exceeding the flowers, thin :—
 - i. Racemes congested, usually not exceeding the petioles :—
 - Erect shrub, 4-6 ft. high; leaves ovate or oblong lanceolate. 3. *F. congesta*.
 - Suberect or prostrate undershrub under 3 ft. high; leaves narrow lanceolate. 4. *F. prostrata*.
 - ii. Racemes elongate, 4-6 in. long :—
 - Base of leaflets 3-4 nerved. Leaf glands not persistent; bracts long, acute or acuminate; pods almost glabrous. 5. *F. semialata*.
 - Base of leaflets 5 nerved; leaf glands persistent; bracts short, subacute or obtuse, densely brown felted; pods gland pubescent. 6. *F. latifolia*.
- 2. Flowers very small in lax peduncled often paniced racemes exceeding the leaves. Bracts not conduplicate. small. An undershrub. 7. *F. lineata*.
- B. Flowers in heads :—
 - Erect shrub, surrounded by large bracts. 8. *F. involucrata*.
 - Trailing herb with tuberous root; bracts small, caducous. Cultivated. 9. *F. vestita*.

1. Flemingia strobilifera R. Br. Vern. *Makhloti*, Upp. Ass.; *Makhloti*, Ass. (Kam.); *Ka-Khong*, Khasi.

A shrub usually 5 ft. high but sometimes up to 10 or even 12 ft.; stem blackish, rough; branches terete, more or less

velvety. *Leaves* 1-foliolate, 3-6 by 1-3 in., oblong to ovate-lanceolate, acute or acuminate, rounded at the base, chartaceous or subcoriaceous, green and glabrescent above, pale, thinly silky pubescent and with garnet-like gland dots beneath; lateral nerves 8-12 on either side of the midrib, often subopposite, very oblique, almost straight, rusty pubescent; tertiary nerves transverse; petiole $\cdot 2\cdot 75$ in. long, swollen at both ends; stipules $\cdot 2\cdot 4$ in. long, linear-lanceolate, acuminate, scarious. *Flowers* about $\cdot 3$ in. long, purplish, first in small 3-4 flowered cymes hidden in the axils of large kidney-shaped conduplicate membranous bracts, $\cdot 8\cdot 1\cdot 4$ in. across, often cuspidate at the apex, which again are arranged in terminal and axillary racemes, 3-6 in. long; rachis zigzag, downy; bracts translucent, scarious with age, strongly reticulate, more or less puberulous, sparsely gland dotted on the inner surface; bracteoles minute, linear, caducous. *Calyx* velvety and gland dotted outside; teeth linear-lanceolate, almost longest. *Corolla* glabrous, exserted. *Pod* $\cdot 3\cdot 4$ in. long, finely downy, 2-seeded.

Grass lands in UPPER ASSAM and sal areas in LOWER ASSAM; also up to 4,000 ft. in the KHASI HILLS.

At the end of the month of Chaitra (= about the middle of April) cattle are given a special bath in the Assam Valley after which they are gently beaten with the branches of this plant to keep them free from disease.

Flrs. 2-3. Fr. 4-6.

2. *Flemingia stricta* Roxb. Vern. *Dangshu-khop*, Mech; *Mi-surung-pu-arong*, Mik.; *Kombat-lai-jiri*, Khasi.

A sparingly branched shrub 6-12 ft. high; branches 3-quetrous, hairy. *Leaves* digitately 3-foliolate; common petiole 2-5 in. long, 3-quetrous or flattened, scarcely or very narrowly winged, furrowed; stipules 2-4 in. long, lanceolate, acuminate, finely silky outside, rigid and closely longitudinally parallel veined. *Leaflets* 6-12 by $2\cdot 5\cdot 4$ in., lanceolate or oblong-lanceolate, gradually narrowed to a sharp apex, terminal narrowed also to the base, lateral oblique, the outer half being rounded at the base, subcoriaceous, glabrous or somewhat hispid above, pubescent along the nerves beneath; glandular dots few, minute, black, opaque; lateral nerves 12-20 on either half, very oblique, slightly arched; petiolules $\cdot 15\cdot 3$ in. long,

terete, stout, densely rusty-silky. *Racemes* 3-4 in. long, spicate, dense-flowered; bracts caducous, .6-1.5 in., resembling the stipules in every respect excepting in size imbricating when young, giving the inflorescence a cone like appearance in bud; pedicels very short. *Calyx tube* about .12 in. deep; teeth long, the lowest as long as the corolla, densely hairy. *Corolla* .3-.45 in. long, purple. *Pod* .5-.6 in. long, glabrescent.

In shady and more or less damp localities in the PLAINS, also in ravines in the HILLS in both Valleys.

Flrs. 1-3. Fr. 6-9.

3. *Flemingia congesta* Roxb. Vern. *Samnaskhat*, Garo.

A shrub 4-6 ft. high; old stem terete, glabrescent; branches flattened or angular, slightly ribbed, adpressed silky pubescent when young. *Leaves* 3-foliolate; common petiole 2-4 in. long, flattened, often margined but never winged, sulcate; stipules .5 in. long, linear-lanceolate or triangular, scarious, caducous. *Leaflets* 4-6 by 2-3 in., ovate or oblong-lanceolate, acute or shortly acuminate, the lateral oblique, glabrescent but more or less scabrid above, pubescent along the nerves and with brownish glandular dots beneath; base in terminal leaflet cuneate, in the lateral leaflets rounded on the outer margin, strongly 3-nerved; main lateral nerves about 6 on either side of the midrib above the basal pair. *Racemes* usually dense, 1-2 in. long, sessile, sometimes branched; often fascicled; bracts about .2 in. long, lanceolate, sharply acute or acuminate, scarious, silky caducous; pedicels very short. *Flowers* about .5 in. long, purplish. *Calyx* densely silky, gland dotted; teeth lanceolate, lowest longest but narrower. *Corolla* as long as the calyx; standard greenish-white, striped with pink. *Pod* about .5 by .3 in., turgid, obscurely brown-velvety, gland dotted when young, 2-seeded. *Seeds* about .1 in. diam., brown or blue-black, shining.

Fairly common in dampish localities throughout the plains of both VALLEYS, specially in submontane regions.

In Var. *typica* the petiole is scarcely margined. In our area var. *viridis* Prain appears to be common which differs from the type in having the petioles slightly winged towards the top.

A purple dye is obtained from the glands at the base of the hairs covering the pods.

Flrs. 4-8. Fr. 11-2.

4. *Flemingia prostrata* Roxb. Syn. *F. congesta* var. *semialata* *F. B. I.* in part.

A suberect or trailing undershrub up to 2·5 ft. long; stem angled, grooved, silky tomentose when young. *Leaves* 3-foliolate; petiole 3 angled, slightly or not winged, silky pubescent; stipules ·3-·4 in. long, scarious, lanceolate. *Leaflets* 1·5-3 by ·3-·5 in., narrow-lanceolate, cuspidate-acute; base of terminal leaflet cuneate; lateral leaflets oblique and rounded on the outer side, subcoriaceous, somewhat rough and thinly pubescent or glabrescent above, softly brown tomentose beneath; basal nerves usually 3, short; lateral nerves 6-8 on either side above the basal, all impressed above, prominent beneath. *Racemes* very dense, usually shorter than the petioles; bracts up to ·3 in. long, lanceolate, acuminate, densely pubescent outside. *Flowers* up to ·25 in. long, pink and yellowish green. *Calyx* densely villous; lobes linear, acuminate, lower exceeding or equalling the corolla. *Pod* hairy, gland dotted when young up to ·4 in. long.

KHASI HILLS, 5,000 ft., Mann. Probably in grass lands in other Districts also.

The stems are usually annual from a perennial root stock. This plant appears to be a degenerate and dwarfed form of *F. congesta*, but as it has sufficiently well-marked characters differentiating it from that species it has been separated.

Flrs. 8-9. Fr. 9-11?

5. *Flemingia semialata* Roxb. Syn. *F. congesta* var. *semialata* *F. B. I.* Vern. *Salpan*, Beng.; *Bhatte*, Nep.; *Achakkimi-chong*, (=dog's tail), Garo; *Papai*, Jharua; *Kelbe*, Tipp.

A shrub very closely resembling *F. congesta*, but generally much taller; the branches more sharply angular; the petiole shorter and winged; leaflets 3-4 nerved at the base; the racemes much longer (up to 6 in.) exceeding the petioles and laxer; calyx-teeth narrower and the pod only very slightly pubescent. *Flowering* and fruiting time and

habit about the same, but it ascends to a higher elevation, nearly up to 5,000 ft.

Wood with discontinuous concentric soft wavy bands and close continuous medullary rays, not durable.

6. *Flemingia latifolia* Benth. Syn. *F. congesta* var. *latifolia* *F. B. I. Vern. Jambru-soh-attekki-arong*, Mik.

A robust shrub up to 10 or 12 ft. in height with dark-brown cylindrical stem, and obscurely angular sulcate branches. *Leaves* 3-foliolate; common petiole 2·5-4·5 in. long, flattened and narrowly margined. *Leaflets* 4-9 by 2·3-5 in., elliptic or obovate-lanceolate, chartaceous or subcoriaceous, acute or acuminate, finely tomentose and dotted with long persistent ruby or garnet coloured glands on both surfaces, base acute, in lateral leaflets sometimes rounded on the outer margin, strongly 5-costate; inner pair of nerves often running to near the top; petiolules ·2-·25 in. long, stout, terete, densely velvety. *Racemes* terminal and lateral, 2-5 in. long, solitary or in fascicles of 2-3; rachis stout, swollen at nodes, greyish or brown silky-tomentose; bracts ·3-·4 in. long, obtuse or sub-acute, concave, densely silky-tomentose. *Calyx* cup-shaped; teeth ·2-·4 in. long, lanceolate, brown velvety outside, pubescent and thinly gland dotted within. *Corolla* purple, ·4-·5 in. long. *Pod* ·5 by ·2 in., hairy and dotted with glands; seeds ·1 in. diam., globose, dark-brown.

Fairly common, GARO, KHASI and NORTH CACHAR HILLS, up to 4,000 ft.

Flrs. 10-11. Fr. 12-2.

7. *Flemingia lineata* Roxb.

A diffuse erect undershrub 3-5 ft. high; stem terete, glabrescent, blackish; branchlets obscurely angled, pubescent. *Leaves* 3-foliolate, generally not exceeding 4 in. in length; common petiole ·5-·7 in. long, margined, scarcely winged; stipules ·25-·4 in. long, lanceolate, slightly falcate, scarious. *Leaflets* subsessile, ·8-3 by ·3-·8 in., obovate lanceolate or elliptic-oblong; lateral leaflets oblique; apex sub-acute, often, cuspidate, usually 3 nerved and cuneate at the base, chartaceous, plicate between the nerves, subcoriaceous,

glabrescent above, silky pubescent, specially along the nerves and with minute light yellow gland beneath; lateral nerves 3-5 on either half (excluding the basal), very oblique; intramarginal nerve 0 or very obscure. *Racemes* terminal and axillary, 1.5-3 in. long, few flowered, lax, often paniced; rachis slender, pubescent; bracts about .15 in. long, deltoid or subulate, scarious. *Flowers* usually towards the upper portions of the racemes; bracteoles minute, linear, hairy. *Calyx* .2 in. long, hirsute; teeth as long as the tube. *Corolla* purple, not or only slightly exserted. *Pod* .3-.4 by .15 in., obliquely oblong, with short silky bristly hairs, glandular bases outside; seeds 2, black, slightly truncate at the base.

Gregarious on banks and islands of the Brahmaputra below GOALPARA forming dense thickets where it occurs e.g., Kareya in the Mechpara Estate.

Flrs. & Fr. 9-11.

8. *Flemingia involucrata* Benth.

An erect shrub 3-5 ft. high; stem terete, more or less zigzag, patently downy, very finely striate. *Leaves* 3-foliate; common petiole .4-.5 in. long, slightly channelled, brown-felted; stipules as long as the petiole or shorter, lanceolate, scarious-hairy, caducous. *Leaflets* 1.5-3 by .7-1.25 in., elliptic-oblong, lateral oblique, chartaceous, green and somewhat rough above, grey-tomentose and with dark-brown gland dots beneath; lateral nerves 10-15 on either half, slender, straight, continuous; intramarginal nerve 0 or very obscure. *Heads* about 1 in. broad, many flowered, both terminal and axillary, villous, supported by a whorl of 9-12 lanceolate, sharply acuminate, scarious bracts with densely ciliate margins, .4-.6 in. long; peduncle about .5 in. long with usually 2 pairs of decussate bracts which are somewhat broader and shorter than those of the involucre. *Calyx* .5-.7 in. long, densely grey-shaggy; teeth very long, subulate. *Corolla* wholly included, purple; keel obtuse. *Pod* about .2 in. long, oblong, canescent, more or less papery, 1-seeded; seed about .1 in. long, dark-brown or almost black, shining.

Apparently rare. Only once found by the senior author in grasslands at Kaziranga, SIBSAGAR DISTRICT.

Flrs. 9-10. Fr. 11-12.

9. *Flemingia vestita* Benth. Vern. *Soh-phlang*, Khasi.

A much branched trailing herb 1-3 ft. long with patently hirsute wiry stems. *Leaves* 3-foliolate; common petiole .5-1.5 in. long, slender, patently hairy; stipules about .2 in. long, ovate to oblong-lanceolate, scarious. *Leaflets* .5-1 by .4-.8 in., rhomboid or obovate-cuneate, usually sub-acute, overlapping by their margins, sub-membranous, ciliate, green above, pale and with dark-brown glandular dots beneath, sparsely pubescent on both surfaces; petioles very short. *Peduncles* 2-3.5 in. long, mostly terminal, hairy, bearing a 3-6 flowered head of subsessile flowers about .5 in. long; bracts about .1 in. long, boat-shaped, cuspidate. *Calyx* .3-.4 in. long, densely brown-velvety; teeth longer than the tube. *Corolla* deep purplish-red, distinctly exserted; keel much incurved, beaked. *Pod* cylindrical, finely hairy, 1-seeded.

Doubtfully wild. Much cultivated as a field crop in the KHASI HILLS for the sake of its tuberous roots which are eaten raw by the Khasis. The tubers are 1.5-2 in. long and are rubbed clean of the outer skin by trampling by the feet in running water, when they acquire a creamy white, smooth surface.

Flrs. 8-10. Fr. 10-12.

31. ERIOSEMA DC.

***Eriosema chinense* Vogel. Vern. *Soh-pen* or *Pen*, Khasi.**

An erect undershrub 1-2 ft. high growing from a tuberous rootstock; stem slender, sparingly branched, covered with patent brown hairs. *Leaves* 1-foliolate; stipules about .15 in. long, subulate, persistent. *Leaflet* .5-2 by .1-.25 in., ligulate, acute or sub-acute, cuspidate, sub-coriaceous, margins recurved, pilose, dark-green and with a few adpressed hairs above, glaucous, densely grey canescent with concealed glands beneath; midrib prominent, brown pilose; lateral nerves very oblique, indistinct. *Flowers* axillary, solitary or two together. *Calyx* .1-.15 in. long, densely pilose. *Corolla* .2-.3 in. long, yellowish, finely purple

veined, fading to reddish purple; standard roundish, auricled at the base, patently hairy-wings, obovate-oblong, shorter than the standard, but exceeding the keel; keel slightly beaked, gland dotted and hairy towards the top. *Stamens* 2-adelphous. *Ovary* sessile, 2-ovuled, densely villous with spreading silky-hairs; style filiform, glabrous; stigma capitate. *Pods* about .4 by .2 in., compressed, often slightly inflated, densely pubescent, 1-2 seeded. *Seeds* oblique with the funicle attached to the end of a linear hilum.

KHASI HILLS, 4-5,000 ft., fairly common in grass-lands.

The tuberous roots are eaten raw and their cortex is used medicinally.

Flrs. & Fr. 6-10, probably most of the year.

Rhynchosia viscosa DC. Vern. *Bhim-khatraj*, Beng.

A wide spreading climber (woody); young parts glandular-pubescent. *Leaves* usually 3-foliolate. *Leaflets* broadly ovate, acute, terminal one somewhat deltoid. *Racemes* lax, long-peduncled. *Corolla* twice the calyx. *Pod* finely pubescent. *Seeds* not arillate.

Aka Hills. (15321).

32. DUNBARIA W. & A.

Woody climber or twining herbs. *Leaves* pinnately 3-foliolate; stipules setaceous; leaflets gland dotted beneath; stipules rarely present. *Racemes* axillary, flowers generally in pairs; bracts ovate, membranous, caducous; bracteoles 0. *Calyx-tube* campanulate; teeth long and narrow. *Corolla* exserted; standard orbicular, auricled; keel incurved, not beaked. *Stamens* 2-adelphous; anthers uniform. *Ovary* sessile or stalked, many-seeded; style inflexed, beardless. *Pod* compressed, not depressed between the more or less orbicular seeds.

- I. Leaflets membranous, rhomboid or ovate :—
 Terminal leaflet acuminate; flowers distinctly stalked. 1. *D. circinalis*.
 Terminal leaflet acute; flowers subsessile. 2. *D. conspersa*.
- II. Leaflets subcoriaceous, ligulate-oblong;
 terminal rounded at both ends; pedicels as long as the calyx. 3. *D. debilis*.

1. *Dunbaria circinalis* Baker.

A slender woody climber with terete glabrescent stem. *Stipules* minute, caducous. *Leaflets* broadly ovate, acute or acuminate, green and glabrescent above, finely downy beneath. *Flowers* in 6-10 flowered, subsessile, compact racemes. *Calyx* .3 in. long. *Corolla* slightly exserted. *Pod* 2-3 by .35 in., stalked, 8-10 seeded.

Plains of the BRAHMAPUTRA VALLEY.

2. *Dunbaria conspersa* Benth.

A filiform twining herb with downy stem. *Stipules* minute, linear. *Leaflets* orbicular-rhomboid, green and glabrescent above, pale green, obscurely downy and gland dotted beneath. *Flowers* 1-2, rarely 3-4 on very short stalks in the axils of the leaves. *Calyx* .25 in. long. *Corolla* reddish, .35-.5 in. long; keel beaked. *Pod* 1.5-2 by .3 in., recurved, 6-8 seeded.

Plains of both VALLEYS.

3. *Dunbaria debilis* Baker.

A slender twining herb with downy stem. *Stipules* setaceous persistent. *Leaflets* 3-4 times as long as broad, densely canescent beneath, strongly nerved. *Calyx* .25 in. long, grey-downy; teeth linear. *Corolla* yellowish, about .35 in. long; keel beaked. *Pod* linear, recurved, 1.5-2 by .25 in., glabrescent, 8-10 seeded.

KHASI HILLS, 4-5,000 ft.

33. ATYLOSIA W. & A.

Leaves 3-foliolate; stipules small, generally caducous; leaflets gland dotted beneath. *Flowers* in few flowered, long-peduncled racemes, rarely axillary. *Calyx-tube* cup-shaped; teeth distinct. *Corolla* more or less exserted. *Stamens* diadelphous. *Ovary* sessile; ovules 3 or more; style filiform, incurved, glabrous. *Pod* generally oblong, more or less turgid, marked with transverse lines between the seeds. *Seeds* strongly strophiolate.

Terminal leaflet comparatively longer, petioluled; pod 5-6 seeded.

Leaflets all equally and shortly petioluled;

pod 3-4 seeded.

1. *A. barbata*.

2. *A. elongata*.

1. *Atylosia barbata* Baker.

A woody climber with densely pubescent terete branches. *Common petiole* 1-3 in. long, fairly stout, pubescent; stipules about .2 in. long, subulate, caducous. *Leaflets* 2-4 by 1.5-3 in., ovate-rhomboid, rounded and often abruptly subcordate at the base, subcoriaceous, green and somewhat hispid above, greyish and softly pubescent beneath; lateral petiolules about .1 in. long, terminal .5-.7 in. long; stipels bristle-like, minute. *Racemes* terminal or axillary, 3-6 in. long, elongating in fruit, patently pilose; peduncle 2-3 in.; bracts ovate, densely hairy. *Calyx* .5 in. long, shaggy, greenish-grey; teeth about .3 in. long, lanceolate. *Corolla* about .6 in. long, yellowish. *Pod* 1.5-2.2 by .5 in., compressed, shaggy with shining brownish spreading hairs, 5-6 seeded; the depressions between the seeds slightly oblique.

SUB-HIMALAYAN TRACT. Bijni Reserve, GOALPARA.

Flrs. & Fr. 12-2.

2. *Atylosia elongata* Benth.

A slender herbaceous twiner tomentose throughout. *Common petiole* .8-3 in. long, slender. *Leaflets* .7-1.5 by .5-1 in., rhomboid-ovate; petiolule .05-.1 in. long. *Peduncles* 1-3 in. long, slender, 2-4-flowered; pedicels .2-.3 in. long, including the filiform teeth. *Corolla* purple, about .4 in. long. *Pod* .8-.4 in. long, beaked, 3-4 seeded.

In grass-lands in the KHASI HILLS.

Flrs. 8-9.

34. CAJANUS DC.

Cajanus indicus Spreng. Vern. *Arahar*, *Arhar*, *Oror*, Beng., Hind.; *Tuar* or *Tuwar*, Hind.; *Hrhaki*, *Tubarika*, Sans.; *The Pigeon pea*, Eng.

An erect shrub 6-10 ft. high with slender sulcate grey-silky branchlets; main stem terete, smooth, green, often

blotched with large black spots. *Leaves* 3-foliolate; common petiole .8-1.5 in. long, slender, indistinctly ribbed; stipules minute. *Leaflets* 1.5-3 by .3-1 in., narrowly elliptic or oblong-lanceolate, finely acute or acuminate, narrowed at the base, subcoriaceous, green above, grey beneath, silky-velvety, indistinctly gland dotted, minutely stipellate, aromatic when bruised; lateral nerves 5-6 on either half, arched, very oblique; lateral petiolules about .1 in. long; terminal and axillary, long peduncled, silky-pubescent; flowers congested and corymbose at the extremity of the peduncle. *Calyx* .25 in. long; tube campanulate, gland pubescent; teeth short. *Corolla* .6-.7 in. long, yellow, sometimes veined with red. *Stamens* 2-adelphous; filaments alternately longer and shorter. *Style* long, filiform, up-curved; stigma capitate. *Pod* 1.5-2.2 by .3-.4 in., 3-6 seeded, often with purple blotches or streaks, narrowed at both ends, somewhat torulose, with oblique depressions between the seeds, hirsute. *Seeds* .2 in. diam., slightly compressed, not strophiolate; testa from brown-reddish-yellow to blackish or variegated.

The seed is an important pulse and lac is grown on the plant. Extensively cultivated for both purposes, specially in the GARO and MIKIR HILLS.

Flrs. 4-8. Fr. 10-2.

35. DALBERGIA Linn. f.

Trees or climbing shrubs. *Leaves* imparipinnate, with alternate exstipulate leaflets. *Flowers* small in terminal or axillary panicles; bracts and bracteoles small. *Calyx* campanulate; teeth 5, short. *Corolla* exserted, often only shortly; standard broad; wings oblong, as long as the standard; keel-petals obtuse, shorter than the standard, connate at the tip. *Stamens* 9 or 10, monadelphous or diadelphous, usually in two bundles of 5 each, rarely 9+1; anthers minute. *Ovary* stipitate, few-ovuled. *Style* short, incurved, glabrous; stigma capitate. *Pod* thin, flat, coriaceous, 1-4 seeded, indehiscent.

I. Trees :—

A. Stamens 9 in one bundle. Pod strap-shaped :—

Leaflets 3-5, rotundo-rhomboid, acuminate. Flowers in cymosely

branched axillary panicles. Pod 1-3 seeded.

B. Stamens in two bundles of 5 each :—

1. Pod thin, strap-shaped :—

a. Leaflets 9-15, obtuse, glabrate.
Flowers in corymbosely branched axillary and terminal panicles.
Pod 1-3 seeded :—

Reticulations of tertiary nerves weak and open, panicles lax spreading; standard broad obovate or sub-orbicular with a hardened and thickened claw; wood continuous.

Reticulations of tertiary nerves stronger and closer, panicles compact, standard narrow oblong or oblong-obovate; claw not thickened or hardened; wood with concentric rings of bast.

b. Leaflets 15-21, obtuse, glabrate.
Flowers in short axillary panicles.
Pod 1-2 seeded.

Leaflets 17-27, obtuse, hairy.
corymbose panicles. Pod 1-3
Flowers in congested axillary
seeded.

2. Pod rigid, orbicular :—

Leaflets 7-11, acute, glabrous.
Flowers in axillary racemosely branched panicles. Pod 1-seeded.

II. Scandent shrubs :—

A. Stamens 9, rarely 10, in one bundle.

Pod strap-shaped :—

1. Leaflets 5-9, broadly oblong.
Flowers very small in corymbosely branched axillary or terminal panicles. Pod 1-2 seeded.

2. Leaflets 9-15, oblong, glabrous.
Flowers small, usually in corymbosely branched terminal panicles.
Pod 1-2 seeded.

3. Leaflets 13-17, oblong, pubescent.
Flowers in corymbosely branched axillary panicles. Pod 1-3 seeded.

4. Leaflets 25-33, oblong, not oblique at base. Flowers in short congested panicles. Pod 1-2 seeded.

B. Stamens in 2 bundles of five each.

Pod strap-shaped :—

1. *D. Sissoo.*

2. *D. lanceolaria.*

3. *D. paniculata.*

4. *D. assamica.*

5. *D. sericea.*

6. *D. reniformis.*

7. *D. rimosa.*

8. *D. confertiflora.*

9. *D. tamarindifolia.*

10. *D. mimosoides.*

1. Leaflets 9-15, obtuse, glabrous. Flowers in axillary and terminal panicles. Pod 1-seeded. .. 11. *D. Thomsoni*.
2. Leaflets 9-13, obtuse, glabrous. Flowers ebracteate in axillary and terminal panicles. Pod 1-2 seeded. 12. *D. volubilis*.
3. Leaflets 17-25, obtuse, nearly glabrous. Flowers persistently bracteate and bracteolate in axillary panicles. Pod 1-seeded. .. 13. *D. stipulacea*.

1. Dalbergia Sissoo Roxb. Vern. *Hihu*, *Shisham* (Goal.) Ass.; *Khujiap*, Mech.

Ordinarily a middle-sized gregarious and deciduous tree, but in favourable localities quite a large tree; young parts grey-downy. *Bark* grey or light brown, somewhat reticulately longitudinally furrowed, exfoliating in narrow strips, inside light-brown, soon turning to dark-brown, very fibrous. *Leaves* 4-9 in. long; common petiole zigzag, pubescent when young; stipules .2 in. long, caducous. *Leaflets* 3-5, distinctly alternate, 1-2.5 in. across, ovate, obovate orbicular or rhomboid, firmly sub-coriaceous, abruptly acuminate and cuspidate; main lateral nerves about 5 on either half, rather indistinct; tertiaries prominent; petiolules .1-.3 in. long. *Flowers* .2-.3 in. long, in cymose racemes, 1-1.5 in. long, which are corymbosely arranged in axillary peduncled panicles, 2-3 in. long; pedicels minute, usually secund. *Calyx* downy, about half the length of the flowers; teeth short, lowest sub-acute and longest, others obtuse. *Corolla* yellowish-white, standard with a long claw. *Stamens* 9, united in a sheath which is slit along the top. *Ovary* pubescent; style short; stigma large. *Pod* 2-3 by .3-.5 in., strap-shaped, pale-brown, glabrous narrowed at the base to a stipe, .3-.4 in. long, mostly 1-seeded, less often 2-3 seeded, not veined over the seeds. *Seeds* .25 in. long, kidney-shaped, flat.

Throughout the SUB-HIMALAYAN TRACT from above Sadiya down to Kachugaon, on porous sandy and gravelly soils on islands and river banks.

Heartwood brown, mottled with darker longitudinal veins, close grained, very hard and durable; medullary rays very fine, transversely crossed by wavy whitish concentric bands; weight 45-55 lbs. per c. ft. A very valuable timber eminently suitable for furniture and for all purposes where strength and elasticity are required. The twigs and

leaves are lopped for fodder. The tree can be easily raised from seeds or root-cuttings. The best results are obtained from shoot cum root cuttings of healthy nursery raised seedlings.

Flrs. 2-5 with new leaves. Fr. 11-2.

2. *Dalbergia lanceolaria* Linn.

A large deciduous tree, sometimes buttressed at the base; bark smooth, greenish-grey or brownish-yellow inside but instantly turning brown on exposure; young parts rusty hairy. *Leaves* about a foot long; common petiole slightly pubescent; stipules .3 in. long, caducous, linear-oblong. *Leaflets* 7-17, usually 1-2·2 by .6-1·2 in., elliptic or oblong, rounded at the base, generally emarginate at the apex, subcoriaceous, glabrous and green above, lightly grey pilose and pale beneath; lateral nerves very indistinct, slightly arched; reticulations of tertiary nerves rather open; petiolules up to .2 in. long. *Panicles* axillary and terminal, 6-10 in. long with wide spreading branches, which are generally pubescent; bracts minute, caducous. *Calyx* about .1 in. long, silky outside; teeth unequal; upper teeth obtuse, lowest longest and acute. *Corolla* .2·3 in. long, dull-white or pinkish white; standard broadly obovate or sub-orbicular, about .25 in. broad, with a greenish callosity at the base of the limb, somewhat abruptly bent from the hardened and thickened short claw longer than the wings, which again are longer than the keel. *Stamens* in two bundles of 5 each. *Pod* 2·5 by .5·7 in., often sinuate between the seeds, and narrowed at both ends, flexible on a stipe, .3·5 in. long, glabrous, light-brown, mostly 1-3 seeded, veined over the seeds.

UPPER ASSAM between Makum and Margherita, very rare. Wood pale-yellow, not durable, no distinct heartwood.

Flrs. 5-6. Fr. 9-10.

3. *Dalbergia paniculata* Roxb.

Very similar to the above in appearance and the one is very likely to be mistaken for the other. The tertiary nerves of the leaves are more closely and more strongly reticulate, the undersurface is often more densely pubescent along the midrib, the panicles are compact and smaller and all calyx teeth are sub-deltoid. The standard is narrower being oblong-

obovate, often auricled and without any callosity at the base, and the claw is neither hardened nor thickened, but is longer than in the last species.

The wood is useless as timber, having bands of bast alternating with woody tissue.

A specimen collected by Mann, who does not mention the locality, has been referred to this species. It is too incomplete for verification. Very rare if it occurs at all in the province.

4. *Dalbergia assamica* Benth. Vern. *Medeluwa*, *Mouhita*, Ass.; *Murkimora*, *Cach.*; *Iling-kung*, Tipp.; *Peret-asing*, Miri & Abor; *Bon-subaim*, Mech.; *Dieng-maw-phur-wang*, *Dieng-khar-ir*, Khasi; *Dieng-kapudi*, *Dieng-khyrwang-sniang*, Synt.; *Pinhele-siris*, Nep.

A middle-sized deciduous tree attaining 80-90 ft. in height and 6-8 ft. in girth. *Bark* dark-brown, thin, rough, with more or less parallel vertical fissures, on old trees exfoliating in overlapping strips; inside fibrous, in thin plates, dun or yellowish-brown, turning deep brown on exposure, smelling somewhat like coffee. *Leaves* 9-12 in. long; common petiole terete, glabrous except when very young; innovations silky with adpressed buff or rusty hairs. *Leaflets* 15-21, 1·7-2·8 by ·8-1·2 in., oblong, more or less rounded or subcuneate at the base; apex slightly emarginate, chartaceous or firmly membranous, green above, pale beneath, with adpressed pale hairs on both surfaces especially when young, turning yellow before falling; lateral nerves indistinct, oblique, slightly arched; petiolules about ·15 in. long, always pubescent. *Panicles* axillary, 4-6 in. long, slender, pubescent. *Calyx* obconic, silky outside with the lowest tooth much longer and more pointed than the others. *Corolla* white or purplish blue, about ·25 in. long; standard orbicular, purple veined, with a light green central spot; wings broad; keel incurved. *Stamens* in two bundles of 5 each. *Pod* 1·5-3 by ·25-·5 in., strap-shaped, flexible, pointed at both ends, glabrous, on a slender stipe, ·25-·35 in. long, 1-4 seeded, often warted over the seed.

Closely resembling *D. lanceolaria*.

A rare tree although occurring sporadically in every District, more common in UPPER ASSAM and in the N. E. FRONTIER DISTRICT ascending to about 3,000 ft. in the KHASI HILLS.

Wood light-pale brown, pores large, irregularly distributed, joined by fine wavy lines; medullary rays very fine and regular, fairly ornamental on a radial section.

Flrs. 4-5. Fr. 12-1.

5. *Dalbergia sericea* G. Don. Syn. *D. hircina* Benth. Vern. *Pered-asing*, Miri; other local names of the preceding species are indiscriminately applied where they occur together.

A middle-sized tree up to 80 ft. in height and 6 ft. in girth, often fluted in old age. *Bark* grey, smooth but with very close longitudinal fissures and distant horizontal wrinkles, on old stems, exfoliating in overlapping strips, inside pale yellow, soon turning yellowish brown. *Leaves* 6-12 in. long, rachis terete, persistently grey-hairy. *Leaflets* 17-27, 1-1.5 by .35-.7 in., elliptic or oblong, emarginate, subcoriaceous, persistently adpressed hairy on both surfaces, somewhat pale below, rather strongly veined; petiolules .15-.2 in. long. *Panicles* axillary, corymbose, congested; ramifications ascending, pubescent. *Calyx* about .1 in. long, campanulate, densely pubescent. *Corolla* about .2 in. long, whitish; standard obovate; keel shorter than the wings. *Pod* 1-1.5 by .2 in., very thin, strap-shaped, glabrous, 1-3 seeded, rarely 4-seeded; stipe about .2 in. long.

Very rare. Found along the foot of the Himalayas, *e.g.*, near Sadiya in the N. E. FRONTIER DISTRICT, at Dikrang in LAKHIMPUR, at Charduar in DARRANG and at Maktaigaon in GOALPARA.

Wood greyish white, moderately hard with no distinct heartwood appears to season well, weighing about 40 lbs. per c.ft.

Flrs. 4-6. Fr. 10-11.

6. *Dalbergia reniformis* Roxb. Vern. *Kures*, Sylh.

A large bushy tree with brown-silky branches. *Leaves* 6-11 in. long. *Leaflets* 7-11, 1.5-2 in. long, ovate, acute, rounded at the base, coriaceous, glabrescent. *Panicles* axillary, dense, with silky ramifications. *Calyx* .12 in. long, campanulate, silky; teeth rounded. *Corolla* .2-.3 in. long, white; standard obovate, emarginate. *Stamens* in two bundles. *Pod* rigid, 1-1.2 by .25-.3 in., glabrous, usually 1-seeded, rarely 2-seeded, fleshy when ripe, joints reniform; stipe .25-.35 in. long.

SYLHET-Roxburgh, CACHAR-Frazer, in swampy localities.

Flrs. 3-4. Fr. 10-11.

7. *Dalbergia rimosa* Roxb. Vern. *Gajai-lata*, (Lakh.); *Mermeri-lata*, (Darr.), *Kata-ghoh* (Kam.), Ass.; *Siboudoukha*, *Sibou-phang*, Kach.; *Mei-nup-synrang* (Tharia), *Jermai-bu-tem* (Nongkla), Khasi; *Dieng-thniat-nirai?* Synt.; *Khot*, Garo; *Hikongiru*, Tipp.; *Lewa-phukri*, Mech.; *Kawagurum*, Sylh.

A suberect straggling or climbing shrub with branchlets often formed into tendrils; dormant buds sometimes develop into spines about .3 in. long. *Bark* white outside, yellowish inside. *Leaves* 5-9 in. long; common petiole 2.5 in. long, terete, glabrescent. *Leaflets* 5-9, 2.4.5 by 1.3.5 in., elliptic, obovate or oblong, acute or rounded at the base; acute to obtuse, often emarginate, shortly cuspidate, chartaceous, glabrous, dark-green and shining above, pale and with short adpressed hairs beneath; main lateral nerves about 10 on either half with 1-3 minor ones between each two, arched, tertiaries strongly reticulate; petiolule about .15 in. long, usually pubescent. *Panicle* axillary and terminal, 4-8 in. long with corymbose branches and secund pubescent ramifications. *Flowers* very small (among the smallest in the Papilionatæ), sweet scented. *Calyx* .04 in. long, pubescent; teeth subequal, obtuse, subacute, ciliate. *Corolla* dull-white, scarcely .1 in. long. *Stamens* 10 in one bundle. *Pod* 2.5-4.5 by .7-1.2 in., strap-shaped, much thickened and strongly reticulate over the seeds. *Seeds* 1, rarely 2.

Throughout the plains of both VALLEYS.

The stem is used as axe handles. The seeds are eaten by the Cacharis.

Flrs. 4-5. Fr. 11-12.

8. *Dalbergia confertiflora* Benth.

A woody climber. *Leaflets* 9-15, 1-2 by .5-.8 in., oblong or obovate, more or less emarginate and usually with a small cusp, glabrous, pale beneath, strongly veined. *Panicles* terminal and over a foot long or axillary and 2-4 in. long; ramifications densely pubescent. *Calyx* about .12 in. long, pubescent, supported by a pair of minute bracts.

Corolla .2-.25 in. long. *Stamens* 9, monadelphous. *Pod* 1.5-2.5 by .5-.6 in., thin and flexible, shortly stipitate, generally 1-seeded, veined over the seed or seeds.

Apparently not very common. KHASI HILLS—Kurz, DUFFLA HILLS—Lister, SYLHET—Wallich.

Flrs. 1-3. Fr. 5-6 (?).

***Dalbergia velutina* Benth.**

Woody climber; branches densely brown-tomentose. *Leaves* 6-9 in. long, supported by large persistent velvety stipules. *Leaflets* 13-17, 1.5-2 by .8-1 in., oblong, obtuse at both ends, chartaceous, pale and densely rusty pubescent beneath. *Panicles* axillary, about 9 in. long, peduncled, corymbosely branched, rusty pubescent throughout; pedicels short, bracteate, congested at the ends of the corymbs. *Calyx* about .1 in. long. *Corolla* .15-.2 in. long. *Pod* 2.2-2.5 by .6-.7 in., oblong, flat, deep tan-brown when dry, shining, very finely lanceolate, generally 1-seeded, rarely 2- or 3- seeded.

SYLHET, Wallich's catalogue 5868 B, KHASI HILLS, very scarce.

Flrs. 12-2. Fr. 4-6.

9. *Dalbergia tamarindifolia* Roxb. Vern. *Laleng-chhali*, Ass. (Lakh.), *Dat-bijli*, Ass. (Kam.), *Bon-subai-doukha*, Kach.; *Subin-rikang*, Mik.; *Dukhentri*, Khot, Garo; *Jermei-thuat-siar*, Khasi; *Amlai-lewa*, Jharua & Mech; *Keti*, Beng. (Sylh.).

A large deciduous woody climber often with twisted greenish branchlets; stem blackish, not rough; young parts pubescent. *Leaves* 3-6 in. long; common petiole terete, pubescent. *Leaflets* 25-41, .5-1 by .15-.25 in., subsessile, oblong, slightly emarginate, oblique at the base, membranous, pubescent on both surfaces, thinly above, more densely beneath, strongly nerved when fully mature; petiolule very short. *Panicles* mostly axillary, 1-2 in. long, sessile with corymbose rusty-pubescent branches, dense; flowers with very short pedicels, buds rusty tomentose; bracts and bracteoles broad-ovate or suborbicular, very small, tomentose. *Calyx* with a pair of bracteoles at the base, .1-.12 in. long, campanulate, rusty downy; petals and stamens inserted below the middle of the calyx tube; teeth ovate, obtuse or subacute. *Corolla* white, .25-.3 in. long; petals all clawed; blade of standard orbicular with a small callosity at the base, somewhat abruptly bent from the claw; claw broader and thicker

than those of other petals; wings broader and keel auricled with long slender claws. *Stamens* 9 or 10, monadelphous. *Pod* 1·5-2·5 by ·3-·6 in., strap-shaped, very thin, shining brown, glabrous, finely lineolate, somewhat more closely nerved over the seed or seeds.

Fairly common in the plains and up to 3,000 ft. in the Hills throughout the province.

The bark is often chewed with pan leaves in SOUTH LAKHIMPUR.

Flrs. 1-3. Fr. 9-12.

10. *Dalbergia mimosoides* Franch. Vern. *Dumi-tum*, Garo.

A large woody climber; branchlets blackish, lenticelled, glabrous, often hooked to function as tendrils. *Leaves* 3-5 in. long; common petiole slender, glabrous. *Leaflets* 25-33, ·4-·6 by ·15-·2 in., oblong, sub-cuneate, not oblique at the base, emarginate, membranous, glabrous or nearly so, pale beneath, very finely lineolate underneath; petiolules ·05-·1 in. long, filiform. *Panicles* axillary, 1-2 in. long, rather lax; ramifications minutely puberulous; pedicels about ·1 in. long. *Calyx* campanulate, very small; teeth small, rounded or subacute. *Corolla* not seen. *Stamens* 9, monadelphous. *Pod* 1-2·2 by ·2-·25 in., very thin, flexible, glabrous, 1-3 seeded. *Seeds* straw-colour, ·25-·15 in.; testa thin and papery.

KHASI and NORTH CACHAR HILLS also LAKHIMPUR along the foot of the NAGA HILLS.

Flrs. 3-4 (?) Fr. 12-1.

11. *Dalbergia Thomsoni* Benth. Vern. *Bon-subai-doukha*, Cach.; *Subin-rikang*, Mik.

A large woody climber, glabrous throughout; bark not rough; branchlets lenticelled, often cirrhose. *Leaves* 4-6 in. long; common petiole terete. *Leaflets* often subopposite, 9-15, ·5-1·2 by ·3-·7 in., oblong-obovate or elliptic, emarginate, more or less cuneate at the base, chartaceous, glabrous, green on both surfaces, elegantly veined underneath; petiolules about ·1 in. long. *Panicles* axillary or terminal with ascending branches and scorpioid branchlets. *Flowers* very small, falling off early. *Calyx* very slightly pubescent.

Pod 2·3·5 by ·7·1 in., thin but firm; base cuneate, greenish, glabrous, thickened and veined over the solitary seed; stipe usually ·3·5 in. long.

KHASI and NORTH CACHAR HILLS, apparently not very common.

Flrs. 4-5. Fr. 12-1.

12. *Dalbergia volubilis* Roxb. Vern. *Budu-galwang*, Garo.

A large woody climber with deeply fluted ash-coloured stem; branchlets often functioning as tendrils. *Blaze* white, turning to reddish-brown. *Leaves* 4-7 in. long; common petiole terete, glabrous or puberulous. *Leaflets* 9-13, 1·2 by ·5·1·2 in., obovate, cuneate; apex obtuse, truncate or emarginate, glabrous and green above, very thinly adpressed pubescent and somewhat pale beneath; main lateral nerves numerous, slender, oblique, straight; tertiaries finely reticulate; petiolules about ·1 in. long, slender, thinly pubescent. *Panicles* terminal and axillary, copious, densely rusty pubescent; main branches up to 5 in. long, with dense often recurved corymbose branches, ultimate ramifications secund. *Pedicels* very short. *Bracts* ovate or spatulate; bracteoles oblong-obtuse, both very small and densely pubescent. *Calyx* about ·1 in. long, velvety outside with a pair of bracteoles at the base, upper 2 lobes, obtuse and lower three more or less pointed. *Corolla* ·2·25 in. long, bluish white or light mauve; petals all clawed; standard orbicular, somewhat abruptly bent from the claw, with a swelling at the base, claw thicker than those of other petals; keel petals slightly connate. *Stamens* diadelphous in 2 bundles of 5 each. *Pod* 1·5·2·5 by ·7·1 in., thin, flexible, glabrous, light greenish yellow, usually 1-seeded, somewhat thickened over the thin dark-brown seed.

In deciduous types of forests in GOALPARA, GARO HILLS, SYLHET, KHASI JAINTIA HILLS; probably in similar forests elsewhere.

Flrs. 12-3. Fr. from January onward.

13. *Dalbergia stipulacea* Roxb. Vern. *Dat-bijla* or *Bijuli*, Ass.; *Garo-deosal*, Mech; *Phalwang*, *Khot-budu*, Garo;

Sabima-rikang, *Chamangpe-sude-arong*, Mik.; *Dieng-mei-soh-khwang*, *Dieng-khuruang*, *Mei-phyrwang*, *Dieng-soh-jeruan*, Khasi; *Ching-ching-dit*, Lush.

A large climbing shrub, often a small erect tree or bush; old stems fluted, greyish brown outside. *Leaves* 5-9 in. long; common petiole terete, slender, glabrous, supported by a pair of ovate falcate stipules, about .1 in. long. *Leaflets* 17-25, .8-1.5 by .3-.5 in., oblong, cuneate and slightly oblique at the base, emarginate, membranous or somewhat firm when mature, green and glabrous above, subglaucous and minutely and sparsely hairy beneath; lateral nerves about 15 on either half, slender, irregular. *Panicles* axillary, 3-5 in. long with ascending more or less secund, racemose branches; flowers rather distant, supported by persistent, large bracts and bracteoles; pedicels .2 in. long. *Calyx* about .15 in. long; lowest tooth linear and longer than the others. *Corolla* reddish-purple, .25-.3 in. long. *Stamens* diadelphous in two sheaths of 5 each. *Pod* 2-4 by 1-1.2 in., pendulous, thin, flat, dark-green, ripening to deep brown oblong, more or less obtuse, generally 1-seeded, thickened and rugose over the seed; stipe .5-.6 in. long, slender. *Seed* .7-.9 in. across, flat; testa brown.

Throughout the plains of the Province, very common in the GARO HILLS.

The stem is woody enough to be used as small posts and tool handles.

Flrs. 3-4. Fr. 11-12, often remaining till March.

D. foliacea Wall. An erect tree; young parts pubescent. *Leaf rachis* straight, 3.5-5 in. long. *Leaflets* 9-13, rarely fewer, 2-3 by .5-1.1 in., elongate-oblong or oblong-lanceolate, sub-acute, obtuse or acute, often minutely cuspidate, rigidly sub-coriaceous, thinly pubescent on the nerves when young, glabrescent with age; lateral nerves not prominent, about 10-13 pairs; petiolules .1 in. long. *Flowers* white, fragrant, about .22 in. long in corymbosely branched pubescent panicles at the base, sometimes also from upper leaf axils. *Bracts* and *bracteoles* very small, oblong, ciliate, the latter opposite. *Calyx* about .12 in. long, the lowest tooth longest and sharply acute, others obtuse to sub-acute. *Corolla* about .2 in. long; standard short clawed, about .17 in. long, oblong-obovate, other petals with long claws. *Stamens* 9, rarely 10, united in a sheath slit at the top. *Ovary* on a pubescent stipe. *Pod* not seen, according to Baker in F. B. I. "just like that of *D. rimosa*."

Grown in Govt. Park grounds Shillong; no indigenous specimen collected.

Flrs. 5.

36. PONGAMIA Vent.

Pongamia glabra Vent. Vern. *Naktamala*, Sans.; *Karana*, Sans. & Beng.; *Karchaw*, *Karach*, *Karcha*, Ass.; *Hedem*, Mik. (?).

A small or middle-sized tree with a short trunk and spreading crown, evergreen or leafless only for a short time in March or April; bark grey or blackish and rough outside, green below the cork; blaze soft, light-brown and yellow, .2-.3 in. thick, fœtid smelling. *Leaves* 6-10 in. long, imparipinnate; common petiole terete, slender; stipules caducous, small, oblong, obtuse. *Leaflets* opposite, rarely alternate,* 5-7, 2.4 by 1.2-.3 in., ovate elliptic, acuminate, subcuneate or rounded at the base, chartaceous, glabrous, dark-green above, pale underneath; petiolules .25-.3 in. long. *Racemes* axillary, simple, peduncled, 3-6 in. long; pedicels .2-.3 in. long, in fascicles of 2-4, pubescent, with a pair of minute bracteoles in the middle. *Calyx* small, subtruncate. *Corolla* .5 in. long, white and purple; petals cohering by the tips; standard broad, appendiculate at the base, shortly clawed; wings slightly adhering to the keel, silky outside. *Stamens* monadelphous; the upper stamen being only partially free; anthers versatile. *Ovary* subsessile, 2-ovuled; style incurved; stigma small, terminal. *Pod* 1.5-2 by 1.1-.2 in., woody, flattened, oblong, indehiscent, much thickened at the sutures, not winged, 1- rarely 2-seeded, tipped with the remains of the style. *Seeds* reniform, white streaked with brown, oily.

Occurs in all districts in both valleys except perhaps LAKHIMPUR, often planted along road-sides for shade.

The leaves are good fodder for cows and have valuable medicinal properties. The seeds yield an orange coloured thick oil which is used for illuminating purposes in CHOTA NAGPUR and S. INDIA and is good for many kinds of skin diseases. The wood is yellowish, moderately hard, coarse but even grained, not durable, weighing about 40 lbs. per c. ft.

Flrs. 5-6. Fr. 12-2.

* *Vide* Mr. Sen Gupta's specimen collected from SYLHET and numbered 7691 in my Herbarium.

37. DERRIS Lour.

Usually climbers, rarely trees. *Leaves* imparipinnate, usually exstipellate. *Leaflets* opposite, exstipellate. *Flowers* usually fascicled on the branches of axillary or terminal racemes or panicles; bracts and bracteoles small and usually caducous. *Calyx* campanulate, truncate or minutely toothed. *Corolla* much exerted; standard broad, not auricled; wings long-clawed, often spurred, more or less adnate to the obtuse keel. *Stamens* usually monadelphous; anthers versatile. *Ovary* sessile or subsessile, few-ovuled. *Pod* indehiscent, usually thin, winged down the upper or both sutures. *Seeds* 1 or few, reniform or orbicular.

- I. A middle-sized tree. Leaflets up to 25.
Pod strap-shaped, winged along the upper suture only. 1. *D. robusta*.
- II. Woody climbers :—
 - A. Branches and leaflets glabrous :—
 - Leaflets 3-5. Racemes short, simple or with short basal branches. Pedicels fascicled. Flowers reddish-purple. Pod less than twice as long as broad, upper suture winged. . . 2. *D. uliginosa*.
 - Leaflets 5-7. Racemes paniced. Pedicels solitary. Flowers light red. Pod about 3 times as long as broad, winged along both sutures. . . 3. *D. marginata*.
 - Leaflets 5-9. Panicles with spreading branches. Flowers white. Pod about twice as long as broad, winged on both sutures. 4. *D. thyrsiflora*.
 - B. Branches and leaflets more or less pubescent. Corolla red :—
 1. Racemes short, usually with short branches at the nodes :—
 - Leaflets 5-11. Pod 4-5 times as long as broad. Upper suture winged. 5. *D. cuneifolia*.
 - Leaflets 9-13. Pod about 3 times as long as broad. Upper suture winged. 6. *D. elliptica*.
 2. Racemes paniced :—
 - Leaflets 5-9. Pod 2-3 times as long as broad. Both sutures winged. 7. *D. ferruginea*.

C. Branches prominently lenticelled :—

- Leaflets 7-9, green beneath. Panicles much branched. Pedicels not fascicled. Flowers white. Pod winged along both sutures. 8. *D. Wallichii*.
 Leaflets 9-11, glaucous beneath. Panicles short, usually fascicled. Flowers bluish. Pod winged along both sutures. 9. *D. monticola*.

1. *Derris robusta* Benth. Vern. *Kothia-koroi*, *Mouhita*, *Hitkura*, *Sirkhi*, Ass.; *Diengthing*, *Diengphullot*, *Diengbanthen*, Khasi; *Bon-narje*, *Bon-subai*, Mech; *Bon-subai-phang*, *Murki-mora*. Cach.; *Thing-kha*, Lush.; *Aleng-* or *Aling-thing*, Kuki; *Theng-sak-arong*, *Theng-saksu*, *theng-chak*, Mik.; *Bol-kakharu*, *Bol-tara*, Garo; *Ileng-kung*, *Horuth-ching*, *Kho*, Manip.; *Karanch*, Nep.

A middle-sized deciduous tree with an oval crown. *Bark* greyish white, fairly plain, coarsely fibrous, very light, dun-brown inside with occasional broad streaks of white with rather an unpleasant smell. *Leaves* 5-8 in. long; common petiole slender, channelled above, minutely pubescent. *Leaflets* 5-1·7 by 3·7 in., oblong or elliptic, subacute, minutely mucronate, thinly coriaceous, green and glabrescent above, minutely silky pubescent beneath; main lateral nerves 5-6 on either half; nervules very closely reticulate; base unequal; petiolules upto 1 in. long. *Racemes* axillary, 5-10 in. long. *Flowers* white, fascicled on slender grey-downy pedicels, 2·3 in. long. *Calyx* 1·15 in. long, broadly campanulate, subequally deltoid-toothed, brick-red outside, pubescent with golden hairs. *Corolla* 3·5 in. long; standard erect, orbicular, emarginate, faintly parallel veined with a faint yellow blotch above the 1 in. long claw; wings 25 in long, clawed; keel-petals sub-falcate about 3 in. long. *Stamens* often diadelphous. *Ovary* canescent; style incurved. *Pod* 1-2·5 by 35·5 in., 1-5 seeded, narrowed to both ends, glabrous, reticulate, winged along the upper suture. *Seeds* brown, about 1 in. across, orbicular, compressed.

Common throughout the plains of all DISTRICTS in the PROVINCE and up to 2,500 ft., in the HILLS.

Wood hard of a light-brown colour, no distinct heartwood, used

for house-posts and ploughs, weighing about 50 lbs. per c. ft. The leaves are lopped for fodder. The tree is much planted as a fertilizer in tea-gardens.

Flrs. 4-5. Fr. 11-12.

2. *Derris uliginosa* Benth.

A large climber with glabrous branchlets marked with large white lenticels. *Leaves* 6-10 in. long; common petiole terete, puberulous, stout. *Leaflets* 3-5, 2-4 in. long, oblong or oblanceolate, or oblong, usually bluntly short acuminate or subobtusate at apex, coriaceous, glabrous but often pubescent along the nerves beneath; lateral nerves 5-7 on either half, oblique, fairly straight, prominent beneath, depressed above; petiolules .1-.12 in. long, stout and stiff. *Racemes* axillary, short-peduncled, 3-6 in. long, generally unbranched; pedicels fascicled, short. *Calyx* about .1 in. long, campanulate; teeth obscure. *Corolla* about .4 in. long, reddish-purple. *Pod* 1-2.5 by .7-.9 in., oblong, 1-2 seeded, flat but rigid, glabrous or thinly pubescent, prominently veined, thickened at the sutures, sharply winged along the upper suture.

Apparently not very common. Grows in swampy places in certain parts of the SIBSAGAR DISTRICT, e.g., Tengapukhri.

Flrs. 4-5. Fr. 8-10.

3. *Derris marginata* Benth. Vern. *Mei-indroh*, *Mei-soh-phlang*, Khasi.

A powerful evergreen climber with dextrorsely twining thickly lenticelled branches. *Leaves* 6-10 in. long, 5-7 foliolate, glabrous throughout. *Leaflets* 3-7 in. long by 1-2 in., oblong, lanceolate or elliptic oblong, long acuminate, more or less rounded at the base, thinly coriaceous, shining above, pale beneath; main lateral nerves 10-12 on either half with many fainter ones between; tertiaries closely reticulate; petiolule .2-.4 in. long. *Racemes* paniced with several slender lax-flowered branches; pedicels filiform, bracteate, .5 in. long. *Calyx* small, broader than long. *Corolla* pale-red, about .5 in. long. *Pod* 4-6 by 1.5-1.7 in., oblong or oblong-lanceolate in outline, narrowed at both ends, thin and flexible, finely veined, 1-2 seeded, broadly winged along both sutures.

SUB-HIMALAYAN TRACTS in KAMRUP, *e.g.*, Doimara and southern slopes of the KHASI HILLS, *e.g.*, Nongkla, etc.

The inner wood is hard and tough and might be utilized in bent-wood industry.

Flrs. Rainy season. Fr. 12-1.

4. *Derris thyrsiflora* Benth. Vern. *Thebu-rikang* or *Thepu-rikang*, Mik.; *Rumaiji-doukha*, Cach.

A large woody climber; bark rough and grey outside, yellow inside. *Leaves* 9-12 in. long, glabrous throughout. *Leaflets* 5-9, 2-6 by .9-2 in. long, elliptic to oblong-lanceolate, abruptly bluntly acuminate, quite entire, rounded or cuneate at the base, coriaceous, pale beneath; main lateral nerves 5-7 on either half, slender, arched. *Panicles* terminal, up to a foot long, with numerous ascending racemose branches with pubescent rachis; pedicels short, not fascicled. *Calyx* about .12 in. long. *Corolla* whitish, about .5 in. long. *Pod* 1.5-3 by .7-1.2 in., glabrous, veined, 1-3 seeded, with narrow wings of uniform width on both sutures.

NORTH CACHAR HILLS, *e.g.*, Panimur, banks of the Daiung river, etc.

Flrs. 8-9. Fr. 12-1.

5. *Derris cuneifolia* Benth.

A large climber with tomentose extremities while young; old stem warted. *Leaves* 6-12 in. long. *Leaflets* 5-9, rarely up to 11, variable in size, usually 3-5 in. long, but sometimes attain 7.5 in. or may be only 1.5 in. long, sometimes alternate, obovate-oblong, or elliptic-oblong, usually bluntly short acuminate, cuneate or narrowed, sometimes rounded at the base, entire, subcoriaceous, pale underneath; main lateral nerves 5-6 on either half, very faint; petiolules short. *Racemes* axillary, sometimes fascicled, often .2 in. long, slender, pubescent. *Calyx* about .12 in. long, campanulate, shortly toothed or sub-truncate, densely brown ciliate. *Corolla* about .5 in. long, red or purple, fading to white. *Pod* obliquely elliptic-obovate or oblong, 1-1.5 by 1 in. long, turgid, generally 1-seeded. with a narrow but sharp wing along the lower suture.

Evergreen forests in UPPER ASSAM, e.g., Gaurisagar in SIBSAGAR, at Jhalukbari in KAMRUP, also in SYLHET and CACHAR and southern slopes of the K & J HILLS.

Flrs. 4-5. Fr. 11-12.

6. *Derris elliptica* Benth. Vern. *Bakal-bih*, *Mokoi-sopa*, *Etam-chali*, Ass.; *Hiru-alu*, Mik.

A large woody dextrorse climber with long switchy velvety branches. *Leaves* 9-15 in. long, long-petioled. *Leaflets* 9-13, 2.5-6 by 1-2 in., oblong, obovate-oblong, sub-acute, or abruptly and often bluntly short acuminate, minutely mucronate, firmly chartaceous, glabrous above, softly pubescent beneath; lateral nerves 6-7 on either half, oblique, slightly arched, impressed above; petiolules .15-.2 in. long, stout, brown-pubescent. *Racemes* terminal or from upper axils, 3.5-10 in. long with short branches from the nodes and sometimes with long branches from near the base, lax-flowered; rachis and branches brown-pubescent. *Calyx* .15-.2 in. long, oblique, short toothed, pubescent outside. *Corolla* red or whitish, .6-.7 in. long; standard silky on the back. *Stamens* monadelphous, but upper nearly free except in the middle. *Pod* 1.5-3 by .7-1.2 in., 1-3 seeded, rigid, reticulate, but with raised sutures, with a narrow wing along the upper suture, glabrescent.

Throughout the plains of Assam, generally in grass-lands and glades.

The roots are used to poison fish and the bark is chewed with betel leaves.

The roots contain a large percentage of rotenone which is known to be a valuable insecticide. There is a growing demand for the roots on this account in Europe for agricultural insecticides and for sheep ointment. The fibres are made into coarse ropes.

Flrs. 3-4. Fr. 3-6.

7. *Derris ferruginea* Benth. Vern. *Ruphang-doukha*, Cach.; *Aru*, Tipp.

A woody climber with blackish-brown bark which exudes a watery sap; young parts ferruginous pubescent. *Leaves* 7-10 in. long; long petioled. *Leaflets* 5-9, 2.5 by 1.2-2 in., elliptic or obovate-oblong, usually abruptly but bluntly acuminate, round at the base, subcoriaceous, glabrous

above, softly ferruginous pubescent beneath, specially along the raised veins; lateral nerves 6-7 on either half, arched, impressed above; petiolules $\cdot 15\text{--}\cdot 25$ in. long, stout. *Racemes* axillary, more or less paniced, 8-12 in. long with flowers fascicled at the nodes on filiform pedicles, $\cdot 3\text{--}\cdot 5$ in. long. *Calyx* broadly campanulate, $\cdot 1\text{--}\cdot 12$ in. deep, pubescent outside. *Corolla* $\cdot 5$ in. long, reddish white or red; standard glabrescent or thinly pubescent along the nerves on the back near the top; stamens monadelphous; upper stamens free. *Pod* $1\cdot 5\text{--}3$ by $\cdot 8\text{--}\cdot 12$ in., flat, strongly veined, densely brown silky when young, thinly hairy or glabrescent with age, 1-3 seeded, with a narrow wing along the much thickened upper surface; lower suture with a sharp edge or very imperceptibly winged.

Evergreen forests in UPPER ASSAM down to DARRANG and SIBSAGAR, e.g., Charduar, Dikhumukh, Kalioni, etc.

Flrs. 4-5. Fr. 6-11.

8. *Derris Wallichii* Prain in Journ. Ass. Soc. Beng. Vol. LXVI, pp. 99, 462.

A large subarborescent climber with densely lenticelled brown stem and branches. *Leaves* 10-15 in. long; common petiole terete, glabrous. *Leaflets* generally 7, 3-6 by $2\cdot 2\text{--}5$ in., oblong-lanceolate, lateral somewhat oblique at the base, sub-acute, coriaceous, glabrous; main lateral nerves 5-6 on either half, arched; tertiaries strongly reticulate; petiolules $\cdot 2\text{--}\cdot 3$ in. long. *Panicle* terminal, 8-12 in. long, with ascending racemose branches, 3-5 in. long. *Flowers* white, not fascicled; pedicels $\cdot 15\text{--}\cdot 2$ in. long, pubescent. *Calyx* broadly obconical, sub-truncate, slightly pubescent. *Corolla* $\cdot 6\text{--}\cdot 8$ in. long; standard glabrous. *Stamens* diadelphous. *Ovary* rusty pubescent. *Pods* winged along both the sutures, mature not seen.

Near Haflong in the NORTH CACHAR HILLS, apparently not very common.

Flrs. 4-5. Fr. 7-10 ?

9. *Derris monticola* Prain. in Journ. Ass. Soc. Beng. Vol. 66, pp. 361 and 463.

A climber; stem verrucose with prominent lenticels;

innovations rusty tomentose. *Leaves* 6-9 in. long; common petiole grooved above, glabrous; stipules ovate-obtuse, adnate, rusty pubescent, up to .1 in. long. *Leaflets* 7-11, 2.5-4 by 1-1.5 in., oblong-oblongeolate or oblanceolate, shortly acuminate, cuneate or slightly rounded at the base, chartaceous, glabrous and shining above, glabrescent with age and pale beneath; lateral nerves 6-8 on either half, slender, slightly arched, nervules finely reticulate, but rather indistinct. *Flowers* blue, pale lilac or purple in fascicles on compact racemes; rachis pubescent when young, 2.5-7 in. long; bracts caducous, ovate, small; bracteoles narrower, both densely-pubescent. *Calyx* about .15 in., brown, pubescent; teeth subdeltoid; standard suborbicular, clawed with a green centre. *Stamens* monadelphous, upper nearly free at the base and towards the top. *Pods* winged along both sutures.

KHASI HILLS above 5,000 ft., e.g., Saitshylliah near Nongkersin, Gunner falls etc.

Flrs. 3-4.

Derris scandens Benth.—A large woody climber with lenticellate branches; young parts rusty pubescent. *Leaves* imparipinnate; rachis 2.5-6 in. long, channelled, glabrescent with age. *Leaflets* 7-11, .9-3 in. by .5-1.4 in., oblong or obovate-oblong, apex often tapering, obtuse, subcoriaceous, glabrous above, puberulous beneath; secondary nerves somewhat obscure, 6-8 on either half; petiolule .1-1.5 in. long, slender, pubescent. *Flowers* white or pink, .25-.3 in. long in fascicles on long axillary and terminal rusty pubescent racemes, up to 12 in. long, often branched; pedicels up to .2 in. long. *Calyx* .1 in. long, truncate, silky pubescent. *Corolla* exserted; standard suborbicular, slightly cordate near the claw. *Stamens* monadelphous; upper stamen half or more, free. *Pod* 2-3 by .4-.5 in., 1-3 seeded, often sinuate between the seeds with a narrow wing on the upper suture.

May be found in LAKHIMPUR, KAMRUP & DARRANG DISTRICTS.

Flrs. rainy season. Fr. Cold season.

38. DALHOUSIEA Grah.

Dalhousiea bracteata Grah. Vern. *Pahari-lata*, *Tekala-lata*, Ass. (Sib.); *Teli-lat*, Ass. (Darr.); *Paitha-gach*, *Hunkhuri-lewa*, Ass. (Kam.); *Nirong-riubi*, Abor; *Mei-mithai*, *Mei-dieng*, Khasi; *Luyang-thu*, *Angthu-rikang*, *Loi-angthu*, Mik.; *Mishen-doukhka*, *Makhoi-jalla-doukhka*, Cach.; *Nahoi-rang*, Tipp.; *Kali-gauj*, Nep.

An evergrown woody climber with ashy grey bark; young shoots thinly hairy. *Leaves* bifarious, 1-foliolate; stipules .2-.3 in. long, ovate or suborbicular ovate, acute, more or less pubescent, many nerved; petiole terete, .5-2.5 in. long, swollen at both extremities. *Leaflets* 3-8 by 2.5 in., ovate-elliptic or oblong-elliptic, quite entire, abruptly bluntly acuminate, rounded or subcordate, sometimes peltate at the base, chartaceous, glabrous, dark-green, shining above, adpressed-pubescent beneath, specially along the nerves when young, ultimately glabrous; main lateral nerves 8-10 on either half; nervules very closely and finely reticulate, (2,000-25,000 meshes per sq. inch); stipules 0. *Peduncles* axillary, solitary, once or twice bifid, each branch terminating in a bracteate flower; bracts about .2-.3 in. long, resembling the stipules, in pairs at the joints of the peduncle; bracteoles up to .6 in., similar but larger, also in pairs, concealing the flowers. *Calyx* small, campanulate, hairy outside; teeth very short, deltoid, caducous. *Corolla* white, about .25 in. long, exserted; petals almost sessile; standard orbicular, deeply emarginate, wings oblique; keel-petals slightly incurved, connate along their lower margins. *Stamens* 10; filaments free, subulate, glabrous, all fertile; anthers versatile. *Ovary* subsessile, 2-4 ovuled; style incurved, subulate; stigma terminal, small, capitate. *Pod* 3-4 by 1.2-1.5 in., turgid, compressed, tapering at both ends, coriaceous, 1-3 seeded, continuous and white inside. *Seeds* about 1 in. long, compressed and faceted; testa brown; albumen 0.

Common in evergreen forests of all Districts except GOALPARA and GARO HILLS.

The leaves are excellent as wrappers for country cigarettes known as *biris* and would be well worth creating a demand for in Calcutta and other centres.

Flrs. 5-6 (sometimes a second flush in 10-11). Fr. 12-1.

39. SOPHORA Linn.

Sophora acuminata Benth.

A shrub 6-10 ft. high. *Branches* at first grey-silky, but soon glabrescent and green; young parts adpressed rusty villous. *Leaves* imparipinnate, 6.5-12 in.; rachis and

petiolules rusty pubescent. *Leaflets* 9-19, opposite or sub-opposite, 1.5-4 by .5-1 in., oblong-elliptic, oblong-ovate or lanceolate, finely acuminate, quite entire, chartaceous, glabrous and dark-green above, glaucous and with adpressed silky hairs beneath; midrib prominent and perfectly straight; lateral nerves obscure, about 10-12 on either side of the midrib; lateral petiolules about .07 in. long. *Flowers* about 1 in. long, bright yellow, in axillary peduncled racemes. *Calyx* .2-.3 in. long, oblique, grey silky. *Corolla* much exserted; petals equal in length, long-clawed; standard broad, keel obtuse. *Stamens* free or sometimes slightly connate at the base; anthers uniform, versatile. *Ovary* stalked; style incurved. *Pod* 3-5 in. long, 1-4 seeded, distantly moniliform, glabrous, strongly veined and often with a slight metallic lustre; seeds about .35 in. long, oblong, smooth, bright scarlet.

KHASI & JAINTIA HILLS, 3-4,000 ft., e.g. Mawsmat, Sutunga, Lait-soh-um, etc.

Flrs. rainy season. Fr. 9-12.

40. ORMOSIA Jackson.

***Ormosia robusta* Wight.** Vern. *Porghum*, Miri; *Sanachi* or *Sanachi-bloma*, Garo.

A lofty tree upto 100 ft. in height. *Bark* greenish-grey or brown, rough and longitudinally fissured outside, fibrous and light brown or yellowish inside; young parts and inflorescence tawny or rusty tomentose. *Branchlets* thick, sulcate, prominently lenticelled with age. *Leaves* imparipinnate; rachis 5-12 in. long, angled, rusty pubescent, ultimately glabrate; stipules subulate, persistent. *Leaflets* 7-11, opposite, 3-6 by 1-2 in., elliptic-oblong or lanceolate or oblong-lanceolate, entire, acute or shortly, usually bluntly acuminate, rounded or acute at the base, coriaceous, glabrous, dark green above, paler beneath; midrib prominent beneath; main lateral nerves 7-9 on either half, arched; petiolules .15-.25 in. long, stout. *Flowers* in terminal panicles the lower branches of which are from the axils of upper leaves: pedicels upto .2 in. long, enlarging in fruit; bracts .2-.25 in. long, rusty tomentose. *Calyx* persistent, .4-.5 in. long and

about as broad at the mouth, rusty tomentose; lobes subequal. *Petals* dull-white .5-.6 in. long, glabrous, clawed; standard largest, orbicular or slightly broader than long; wing petals obliquely oblong; keel petals obliquely ovate-oblong. *Stamens* 10, free, unequal; anthers versatile. *Ovary* subsessile, villous; style long, filiform, coiled at the end; stigma oblique. *Pod* orange-yellow, 2-4 in. long, 1-2 less often 3-seeded, contracted at the base, dehiscing by both sutures; valves coriaceous, thick, hard when dry. *Seeds* about 1 in. long, oblong, enclosed in a scarlet arillus.

Not common, Nizamghat, NORTH EAST FRONTIER TRACT, Barusali in SIBSAGAR DISTRICT; Lakhipur near CACHAR and SYLHET.

Wood light brown, soft but fairly tough with wavy bands of horny dark tissue. Pores large, scanty; weight roughly 32 lbs. per c. ft.

Flrs. 11-12. Fr. 12-2.

Sub-family II. CÆSALPINIOIDEÆ. (Leguminosæ).

Trees or shrubs, sometimes climbers, rarely herbs. *Leaves* usually 1 or 2-pinnate, sometimes with only 1 pair of leaflets, sometimes 1 foliolate by the union of these; stipels usually 0. *Flowers* irregular or less often subregular, usually 2-sexual. *Calyx* sometimes spathaceous, often with short tube; lobes 5, less often 4, from the fusion of the upper two, usually imbricate. *Petals* usually 5 or less often fewer or 0, ascending, imbricate, the upper one being innermost in bud. *Stamens* 10, some often reduced to staminodes or aborted, rarely indefinite, usually free. *Ovary* free or united by the stipe to the calyx tube. *Pod* indehiscent or dehiscent, often septate but not breaking into 1-seeded joints. *Seed* various, albuminous or exalbuminous.

ARTIFICIAL KEY TO THE CÆSALPINIOIDEÆ.

I. Leaves bipinnate :—

A. Usually armed woody climbers; (in our area). Calyx cleft nearly to the base :—

- | | |
|---------------------------------|-----------------|
| Pod not winged. | 1. Cæsalpinia. |
| Pod winged on upper suture. . . | 2. Mezzoneurum. |

B. Unarmed trees; calyx cleft never more than half way down :—

- Leaflets 2-4.5 in. long; stamens
5, equal. pod thin, dry, not

- saponaceous, winged on the upper suture. 3. *Acrocarpus*.
 Leaflets .75-1 in. long; stamens 10, alternately short and long; pod saponaceous, not winged. 4. *Gymnocladus*.
- II. Leaves pinnate, usually paripinnate :—
 A. Petals 5; stamens unequal, usually 3-5, reduced to staminodes. 5. *Cassia*.
 Stamens equal, all perfect, usually 10. 6. *Cynometra*.
 B. Petals 3, unequal; stamens monadelphous, only 3 perfect; anthers versatile. 7. *Tamarindus*.
 C. Petals 0. Stamens usually 7-8. 8. *Saraca*.
- III. Leaves 1-foliolate, usually of 2 connate leaflets. 9. *Bauhinia*.

1. CÆSALPINIA Linn.

Trees, shrubs or climbers, usually prickly. *Leaves* abruptly 2-pinnate. *Flowers* showy, usually yellow, red, rarely white, in axillary or terminal racemes or panicles. *Bracts* present at least when young. *Calyx* deeply 5 cleft; lobes imbricate, lowest largest and concave; tube short, disk-lined. *Petals* spreading, orbicular, clawed, uppermost smaller than the others (ascending imbricate). *Stamens* 10, free, declinate; filaments often villous at the base; anthers oblong, uniform, versatile. *Ovary* few ovuled; style filiform; stigma terminal. *Pod* various in form, dehiscent or not, smooth or prickly.

Pods armed with sharp prickles :—

Leaflets large. 1. *C. crista*.

Pods unarmed, fleshy :—

Leaflets 7-10 pairs on each pinna, less than 4 times as long as broad. 2. *C. digyna*.

Leaflets 14-23 pairs on each pinna, more than 4 times longer than broad. 3. *C. microphylla*.

1. *Cæsalpinia crista* Linn. Syn. *Cæsalpinia Bonducella Fleming*. The fever nut. *Putikaranja*, Sans. Vern. *Lataguti*, Ass. & Kach.; *Kamburu-rikang*, *Ching-sum-arong*, Mik.; *Nata*, Beng.

A scandent or scrambling prickly shrub; branches downy and armed with more or less straight, fine to strong prickles. *Leaves* 12-18 in. long; stipules large, 2 fid; rachis and its

branches brown pubescent and bearing recurved prickles; stipules foliaceous, pinnatisect; segments obovate. *Leaflets* 6-10 pairs on each pinna, opposite, .7-1.7 by .4-.8 in., oblong or elliptic, subacute or obtuse, mucronate, puberulous on both surfaces, specially beneath, petiolules minute, with a pair of short hooked prickles at the base. *Racemes* 6-12 in. long, supra-axillary and terminal, peduncled, gradually denser towards the top; rachis, bracts, buds and pedicels brown-tomentose; bracts .4-.5 in. long, linear-lanceolate, acuminate, exceeding the buds; pedicels .2-.3 in. long. *Calyx* .2-.3 in. long; lobes obtuse, finely rusty tomentose on both surfaces. *Petals* .4-.5 in. long, yellow, the uppermost and smallest often spotted with red. *Filaments* silky hairy on the lower half. *Pod* 2-3 by 1.5-2 in., coriaceous, dehiscent, thickly beset with sharp wiry prickles, .2-.3 in. long. *Seeds* 2-3; testa very hard, shining, lead-coloured, with numerous very fine horizontal cracks when dry.

N. E. FRONTIER, DARRANG, NOWGONG, CACHAR, SIBSAGAR, probably throughout the province in plains and low elevations.

The nuts and the root bark are considered to be tonic, antiperiodic and febrifuge.

Flrs. rainy season. Fr. cold season.

2. *Cæsalpinia digyna* Rottler.

A large scandent or straggling shrub armed usually with hooked prickles. *Leaves* 6-12 in. long, rachis and its branches pubescent or glabrescent; pinnæ 8-12 pairs, 1.5-2.7 in. long; leaflets 7-10 pairs on each pinnæ, .3-.5 in. by .15-.25 in., oblong, glabrescent on both surfaces or minutely adpressed pubescent beneath; apex obtuse or rounded; base oblique; petiolule minute. *Racemes* supra-axillary and terminal, sometimes branched, pubescent when young; bracts nearly obsolete, caducous; pedicels slender, .4-.9 in. *Flowers* bright yellow, .5-.7 in. across. *Calyx* .35 in. long, glabrescent with age; lobes obtuse, lowermost early deciduous. *Petals* orbicular, uppermost reflexed. *Filaments* exserted, lower portion densely wooly. *Pod* 1.3-2.5 by .7-1 in., fleshy, shortly stipitate, crowned by the remains of the style,

1-2 seeded, constricted between the seeds when more than 1-seeded. *Seeds* dark brown, roundish; testa very hard.

CACHAR—Shaik Mokim! probably in other Districts also.

Pods contain as much tannin as *C. coriaria*—the Divi-divi of commerce. It may be therefore worthwhile planting it.

Flrs. 8-10. Fr. 1.

3. Cæsalpinia microphylla Ham. Syn. *C. cinclidocarpa* Miq. *Dari-chik*, Garo.; *Shumugushim-khashiba*, Kach., *Ling-kai-rek*, *Wok-pin-rung*, Kuki.

A prickly climbing shrub; branchlets pubescent when young, lenticellate later on, prickles recurved, almost horizontal with flattened bases on old stems. *Leaves* 9-15 in. long; rachis with paired recurved prickles, finely downy as also the pinnæ; pinnæ 9-12 pairs, 2-4·75 in. long; leaflets 14-23 pairs, ·3-·6 by ·08-·15 in., sessile, linear-oblong, oblique at the base, subcoriaceous and more or less rigid, glabrous and dark-green above, puberulous beneath. *Racemes* paniced, terminal and axillary, 8-15 in. long, brown pubescent when young. *Flowers* yellow; buds ·45 in. long; pedicels ·4-·7 in. long, puberulous. *Calyx* glabrous outside; lobes ·4-·5 in. long. *Petals* obovate to suborbicular, about ·5 in. long, clawed. *Stamens* villous towards the base. *Pod* fleshy, 2-4·5 in. by 1-1·2 in., 1-3 seeded, constricted between the seeds, seeds black, broadly obovoid, plano convex, about ·7 in. long.

LAKHIMPUR, DARRANG, N. CACHAR HILLS, SIBSAGAR, GARO HILLS, GOALPARA—probably in all Districts.

Flrs. 5. Fr. 2-3.

Cæsalpinia pulcherrima Swartz. Syn. *Poinciana pulcherrima* Linn. Vern. *Krishna-chura*, Beng.; Peacock flower; Barbadoes Pride.

A handsome branchy shrub almost unarmed or with few prickles. *Leaves* with 6-9 pairs of pinnæ, rachis 7-11 in. long; leaflets 8-12 pairs, ·4-·7 in. long, broadly oblong or obovate-oblong, emarginate and mucronate, glabrous. *Flowers* orange or yellow, about 1·5 in. across in elongate terminal and axillary racemes; pedicels articulate near the top up to 2·2 in. long in flower, elongating with age. *Petals* 4, subequal, about ·7 in., clawed, crisped, fifth with smaller blade and longer claw. *Pod* compressed.

Sometimes cultivated in gardens in the plains.

Flrs. most of the year except middle of rainy season.

2. MEZONEURUM Desf.

Armed scandent shrubs. *Leaves* bipinnate; stipules small or 0; stipels 0. *Flowers* yellow in axillary or terminal paniced racemes; bracts narrow, usually deciduous; bracteoles 0. *Calyx* very oblique; the tube short, lobes imbricate, lowest longest, hood-like and outermost in bud. *Petals* 5, 4 spreading, subequal or the uppermost smallest. *Stamens* 10, free, exserted; anthers uniform. *Ovary* sessile or shortly stalked, 2-many ovuled; style filiform; stigma small, capitate. *Pod* quite flat, thin, indehiscent with a broad wing along the upper suture. *Seeds* transverse, compressed, orbicular or reniform.

Leaflets 3-6 pairs, 1·5-3 in. long, pod 1 seeded. 1. *M. cucullatum*.

Leaflets 6-10 pairs, ·6-1 in. long, pod 3-6 seeded. 2. *M. enneaphyllum*.

1. *Mezoneurum cucullatum* W & A. Vern. *Baghasora*, *Bagh-anchora*, Ass., *Ghilakata*, (Kam.) Ass.; *Do-jasing-bushu*, *Dudachin*, *Dukher-thri*, *Jakskil*, *Mingoni-jaksikol-bol*, *Mengo-jakskel*, Garo; *Ling-khang*-, *Lushai*; *Banjotatke*, *Kempnerikom-riubi*, *Insu-tengang*, *Miri*; *Kempu-riubi*, *Abor*; *Paniphigag-taraw*, *Duff.*; *U-sia-lobo-sning*, *Mei-sai-ong*, *Mei-sia-singiong*, *Kh.*; *Kuchai-lot*, *Syl.*; *Sa-musrom*, *Sila-Nasukur*, *Mech.*; *Ingsu-chartel-arong*, *Mik*.

A large straggling scrambling shrub; branches glabrous, covered with blackish hooked prickles which in old stems have thick corky bases. *Bark* thin, yellowish grey outside, light red inside. *Leaf* rachis and its branches armed with hooked prickles, the latter 8-12 in. long; pinnæ 2·7-5·5 in. long, distant, 2-4 pairs; leaflets 1·5-3 by ·9-1·2 in., 3-6 pairs, ovate or elliptic to obovate-oblong, bluntly acuminate; base cuneate or rounded, sometimes unequal, glabrous, somewhat glaucous beneath, subcoriaceous; sec. nerves fine, not stronger than tertiaries. *Racemes* terminal and axillary, often from old wood, branched, attaining about the same length as the leaves, usually with few weak prickles; pedicels jointed, ·2·3 in. long. *Calyx* ·4 in. long, deeply divided, tube lined with the disk, yellow, lowest lobe much hooded, largest, ·3·5 in. long, obtuse at the apex. *Petals* ·25·3 in. long, bright yellow, upper folded, purplish, deeply 2 lobed. *Stamens*—one exceeding the others and 5 short; filaments with

few hairs near the base; anthers red. *Pod* 3-4 by 1.1-1.3 in., reddish-brown including the papery wing, which is about .25 in. broad, obliquely oblong, thin, stipitate, 1-seeded.

Throughout the province ascending to about 2000 ft., in the KHASI HILLS.

Flrs. 11-2. Fr. 3-4.

Var. *grandis* F. B. I.—is the robust form of the plant with leaflets up to 4 in. long and 1.6 in. broad and occurs in the same localities.

2. *Mezoneurum enneaphyllum* W&A. *Erachora*, Kochra, kaint, Ass.; *Sujigubung*, Cach.; *Ling-khang*, Lushai; *Hamputo*, Naga; *Ingsu*, *Borplak-asimi*, Mik.; *Ratiasing*, Miri; *Dadu-asing*; Abor.

A scandent glabrous shrub armed with sharp hooked prickles. *Leaf-rachis* 8-12 in. long, armed; pinnæ 12-20, 2-3 in. long, usually unarmed; leaflets 6-10 pairs, .6-1 by .2-.4 in., oblong or obovate oblong, obtuse at apex; base often unequal, thin, glabrous or nearly so. *Racemes* paniced, attaining 12 in., pubescent when young; pedicels .5-.7 in. long, jointed near the top. *Flowers* about .5 in. across. *Calyx* greenish-yellow, .3 in. long; petals bright yellow; filaments shaggy, unequal. *Pod* 3.5-6 by .9-1.6 in., sometimes 7 by 2.2 in.; wing .3-.6 in., 3-6 seeded.

NOWGONG, SYLHET, LUSHAI HILLS, SIBSAGAR, CACHAR, GOALPARA, probably in all plains forests.

Flrs. 9-11. Fr. 12-1.

3. ACROCARPUS W & A.

Acrocarpus fraxinifolius Wight. Vern. *Bol-mangal*.? *Silchhal*, Garo; *Thing-rigetot*, Kuki; *Dieng-ji-rep*, Kh.; *Mech-kuri-bol*, Kam.

A tall deciduous unarmed tree, ordinarily attaining about 100 ft. in height and over 10 ft. in girth; stem often buttressed. *Bark* dark-brown or brownish-grey, rough and warty, reddish-brown inside; young shoots and inflorescence reddish brown, tomentose; branches with warty lenticels. *Leaves* bipinnate, pinnæ 5-7, 6-12 in. long; leaflets 5-8 pairs, 2.4-5 by .75-2.2 in., oblong-ovate or elliptic-lanceolate,

shortly acuminate; base often unequal, ultimately glabrous or nearly so, subcoriaceous; lateral nerves 7-10 on either half; petiolules up to .1 in. long. *Flowers* about 1.2 in. long (including the stamens), dull red or orange, nodding, in dense erect racemes up to about 12 in. long; pedicels short, tomentose. *Calyx* about .4 in. long, campanulate, brown pubescent outside, cleft half way down. *Calyx tube* persistent, at least partly in fruit; segments 5, equal, lanceolate or ovate acute, more or less villous towards the apex outside; disk completely lining the tube. *Petals* 5, slightly imbricate in bud, about .4 in. long, red towards the extremity, greenish towards the base, linear-oblong or oblanceolate-oblong, rusty villous. *Stamens* 5, long exserted, equal; filaments stout, dilated towards the base; anthers uniform, versatile. *Ovary* linear, extruded on a long thinly hairy stipe, the base of which is adnate to the lower end of the calyx tube; ovules many; style incurved, very short; stigma small, terminal. *Pod* 4-5.5 in. long, thin, dark-brown, winged on the upper suture, tapering at the base to the long stalk, which is .5-.7 in. long. *Seeds* up to 18, compressed, .15-.2 in. across.

GOALPARA, GARO HILLS, CACHAR, low elevations in KHASI HILLS, on the slopes above SYLHET, NOWGONG.

Usually branches very high up. Trees upto 200 ft. in height and 150 ft. to the first branch have been recorded from the Madras Presidency.

Sap wood white, heart wood light reddish-brown, pores moderate sized to very large, partitioned, enclosed and joined by wavy lines of soft tissue; medullary rays fine and moderately broad, fairly close. Weight about 39 lbs. per c. ft. (-Gamble). It is used in the Darjeeling District for tea boxes and furniture.

Flrs. 2-3. Fr. 5.

4. GYMNOCLADUS Lam.

Gymnocladus assamicus Kanjilal ms ex Kanjilal. f. sp. Nov. Assam Forest Records Vol. I. p. 7, 8.

A small tree attaining about 40-50 ft. *Bark* reddish brown with an outer reticulating corky layer, living bark thin, yellowish. *Leaves* 2-pinnate, rachis terete, 12-15 in. long, obscurely glandulose, swollen at the base, pinnæ 12-14 pairs, opposite or distantly subopposite, 5-9 in. long, slightly channelled. *Leaflets* odd pinnate, 25-27 on each pinna.

minutely petioluled, subopposite to alternate, .75-1 by .25-.4 in., oblong to ovate-oblong, minutely mucronate, nearly glabrous above, minutely brown pubescent beneath on the mid-rib; main lateral nerves 6-8 on either side, very obscure, slightly elevated above, depressed beneath; base rounded to slightly cuneate, often very slightly oblique, petiolules short, sparsely adpressed hairy. *Flowers* .4-.6 in. long in erect, densely grey, shaggy racemes, 4.5-9 in. long; bracts and bracteoles 0. *Calyx* villous outside and also at the throat and along the ribs inside, except towards the base; tube .25-.33 in. long, narrowly funnel shaped; segments 5, subequal, short, .17-.25 in. long, linear lanceolate to subulate. *Corolla* purplish, grey, shaggy throughout; petals 5, .3-.4 in. long—narrowly ovate to liguliform. *Stamens* 10, exserted, alternately shorter, longer opposite the calyx segments; filaments stout, very short, shaggy; anthers oblong, ovoid, 2 celled. *Pod* 5.5-7 by about 1.5 in., 6-8 seeded, compressed, turgid over the seeds, valves fleshy; paricarp polished, mesocarp saponaceous. *Seed* .6-.8 by .5-.66 in., ovoid or subglobose, bluntly trigonous; testa black, horny, extremely hard, radicle erect.

KHASI HILLS about 5000 ft. Laitseh, Marngor—rare.

The Khasis use the fleshy pods for washing the hair as substitute for soap. Wood hard, yellowish white, weight about 57 lbs. per c. ft.; medullary rays fine, numerous, fairly equidistant. Pores moderate sized in irregular strings of 3-5, joined by lines of soft tissue, annual rings marked by a thin line of soft tissue.

Flrs. 2-3. Fr. cold season next year.

5. CASSIA Linn.

Trees, shrubs or herbs. *Leaves* paripinnate, rachis often with glands between the leaflets or at the base; stipules various; stipels 0. *Flowers* often showy, usually yellow, sometimes pink, in racemes, panicles, supra-axillary fascicles or solitary; bracts and bracteoles present. *Calyx tube* very short; lobes 5, imbricate. *Petals* 5, imbricate, subequal or the lower largest. *Stamens* 10, rarely all perfect or equal, 3-5, usually the uppermost wanting or reduced to staminodes; anthers of the three lowermost stamens often longest, all dehiscing by terminal slits or pores. *Ovary* sessile or stalked, linear, many ovuled; style incurved; stigma terminal, usually

truncate, sometimes ciliolate. *Pod* variable, dehiscent or indehiscent, terete or flat, usually septate between the seeds. *Seeds* transverse in the pod, usually compressed, albuminous.

- I. Trees. Stamens 10, all anther bearing; pod woody, indehiscent; leaflets not exceeding 12 pairs :—
 - Flowers yellow in lax racemes; leaflets 4-8 pairs. 1. *C. Fistula*.
 - Flowers pink in corymbose racemes; leaflets 10-12 pairs. 2. *C. nodosa*.
- II. Shrubs or tall herbs; stamens 6-7 only fertile; pods not woody dehiscent; leaflets not exceeding 12 pairs :—
 - A. Leaf-rachis with one or more glands; valves of pod not winged :—
 1. Leaf rachis with a solitary gland at the base below the lowest pair of leaflets, none between the leaflets :—
 - a. Mature leaves and pods not hirsute; suture of pods more or less thickened :—
 - Leaflets 3-5 pairs, .8-1.2 in. broad, fœtid. 3. *C. occidentalis*
 - Leaflets 6-12 pairs, .4-7 in. broad, not fœtid. 4. *C. Sophera*.
 - b. Mature leaves and pods hirsute; suture of pods not thickened. 5. *C. hirsuta*.
 2. Leaf rachis with glands between the leaflets, none below them :—
 - a. Flowers in pairs on axillary peduncles; pod sub-tetragonous, seeds subcylindric with obliquely truncate ends :—
 - Leaflets obtuse or sub-acute. 6. *C. Tora*.
 - b. Flowers in peduncled racemes; pod turgid, seeds compressed, broadly obovate :—
 - Leaflets under 1.2 in. long, obtuse or rounded at apex. 7. *C. bicapsularis*.
 - Leaflets 1.7-3.5 in., cuspidate acuminate at apex. 8. *C. lævigata*.
 - B. Leaf rachis without any glands, valves of pod with projecting wings along the middle. 9. *C. alata*.
- III. Diffuse undershrub or herb. Stamens 10, all fertile, unequal; pod thin, strap-shaped, dehiscent. 10. *C. mimosoides*.

1. Cassia Fistula Linn. *Suvarnaka, rajataru*, Sans. Vern. *Sonaru, Sonari, Honalu, Honaru*, Ass.; *Honaru, Sonaruarong*, Mik.; *Sonaruphang*, Carh.; *Soneru, Sinaru*, Garo; *Raj-brishi*, Nep.; *Sonali*, Beng. The Indian Laburnum.

A medium sized tree with adpressed pubescent young shoots. *Bark* pale or ashy grey, smooth, usually with horizontal wrinkles or cracks up to middle age, thereafter rougher and dark-brown, green below the outer layer, inner substance light-pink, hard. *Leaves* 9-18 in. long, rachis puberulous; stipules minute, pubescent, early deciduous. *Leaflets* 4-8 pairs, opposite, 2-6 by 1·3-3 in., ovate or elliptic-oblong, acute or sometimes short, acuminate; base cuneate or rounded, subcoriaceous, dark-green and shining above, under-surface silvery pubescent when young and puberulous when mature; lateral nerves fine, subparallel, numerous; petiolule ·2-·3 in. long. *Flowers* yellow, about 1·5-2·5 in. across in axillary, lax, drooping racemes, 8-24 in. long, pubescent when young; pedicels up to 1·7 in. long, gradually longer towards the base; bracts subulate, up to ·2 in. long; bracteoles about ·1 in., both caducous. *Calyx* divided nearly to the base, caducous; segments about ·3-·4 in. long, elliptic oblong, obtuse. *Petals* ·7-1 in. long, obovate, veined, shortly clawed. *Stamens* 10, three lowest longest with curved filaments about 1 in. long and anthers opening by slits, 4-6 lateral with shorter straight filaments about ·4 in. long and anthers opening by pores, the upper 1-3 smallest with indehiscent anthers. *Pod* 1-2 ft. long and about 1 in. across, cylindric, indehiscent, smooth between the seeds. *Seeds* 40-100, about ·4 in. across, ovate in outline, flattened, immersed in a dark-brown sweetish pulp.

Almost all over the province ascending to about 2,000 ft. in the K. & J. HILLS.

A very handsome tree when in flower for which it is sometimes grown in gardens. The heartwood is hard and fairly durable. The pulp of the fruit is a powerful purgative. The leafy twigs are good for cattle fodder. The bark is a good tanning material.

Flrs. 3-6. Fr. cold season.

2. Cassia nodosa Ham. Vern. *Moroi*, Cach.; *Bandarlathi*, Cach. & Syl. *Chohui*, Manipur; *Khorinu-khodong*, Tipp.

A small to middle sized tree with pubescent shoots. *Bark* grey or dark-brown about .2 in. thick, inside fibrous, light brown with streaks of darker brown, yellowish near the cambium. *Leaves* 8-12 in. long, rachis pubescent or glabrescent; stipules crescent-shaped, cuspidate at the free ends, early deciduous; leaflets 10-12 pairs, 2-4 in. by 1-1.7 in., sometimes attaining 5 by 2 in., lowest usually smaller, oblong, oblong lanceolate or elliptic oblong, shortly and sometimes bluntly acuminate or acute; base often somewhat unequal, subcoriaceous, glabrous above, minutely more or less pubescent beneath, specially along the midrib; main lateral nerves 12-15 on either half, slender but prominent beneath; petiolules up to .2 in. long. *Flowers* pink, 2.5 in. across in corymbose racemes, 5-7 in. from old nodes. *Pedicels* 1.2-2 in. long, pubescent, usually supported by a bract and two bracteoles. *Bracts* subpersistent, lower falcate about .6 in., spurred, upper smaller, obliquely lanceolate-acuminate; bracteoles very small, both pubescent. *Calyx* pubescent, red; segments .2-.25 in. long. *Petals* 1.1-.25 by .3-.5 in., subequal, oblong-obovate, subacute or obtuse with distinct midrib. *Stamens* 10; filaments yellow, 3 longer with globose swellings about the middle and hairy anthers, 4 shorter, bearing spurred anthers opening by basal pores, 3 incurved, bearing apparently sterile anthers. *Ovary* hairy. *Pod* 9-18 in. by .5 in., smooth and similar in appearance to that of the last species but more distinctly transversely ribbed.

Not common, Arunachal, Phulertal. Lower Jiri Reserve, etc., CACHAR, Mahur, Mailongdisa, etc., N. CACHAR HILLS, Singla Reserve, Longai Reserve, etc., SYLHET; probably in other Districts also.

A handsome tree in flower.

Flrs. 5-6 and probably throughout the rainy season. Fr. cold season.

3. *Cassia occidentalis* Linn. Vern. *Hant-thenga*, Ass. (Kam), *Naguni*, *Jhan-jhani-gach*, Syl.; *Mithep-phang*, Kach.; *Mei-tar-bi*; Kuki; *Hadi-dika-arong*. Mik.: *Taw-eit-niang-thynthai*, Kh.

A foetid soft wooded undershrub or annual attaining 8 ft. in height, innovations pubescent. *Leaf rachis* 5.5-8 in. long, channelled with a gland at the base; stipules about .3 in.

long, obliquely cordate acuminate, caducous; leaflets 4-5 pairs, 1·6-3·2 by ·8-1·2 in., ovate to oblong lanceolate, sharply acuminate, margin minutely bristly-ciliate at least when young, membranous, glabrous on both surfaces or slightly pubescent beneath; lateral nerves 8-10 on either half; petiolules very small. *Flowers* yellow, ·5-·7 in. across, in few flowered short, axillary or terminal peduncled, corymbose racemes, often forming more or less leafy panicles; pedicels ·2-·25 in. long, elongating in fruit; bracts up to ·6 in. long, whitish with a tinge of pink, ovate to lanceolate, cuspidate acuminate. *Calyx* segments obtuse, ·3 in. long. *Petals* ·5 in. long, obovate-oblong with darker coloured veins. *Stamens* 10, the upper 3 reduced to staminodes, the lower three longer and with larger anthers than the others. *Pod* 3-5 in. by ·25-·3 in., subfalcate, compressed with transverse depressions between the seeds, sutures thickened. *Seeds* 20-30, compressed, pale brown.

Probably originally introduced from TROPICAL AMERICA but now fairly common in forest glades and waste lands ascending to 3,000 ft. in the KHASI HILLS.

The seeds are said to be used as a substitute for coffee in Africa and Mauritius. The leaves, roots and seeds are medicinal. The plant is also used for skin diseases.

Flrs. 7-9. Fr. cold season.

4. *Cassia Sophora* Linn.

An undershrub about 4-5 ft. in height; young parts pubescent. *Leaf rachis* 5·5-10 in. with a conical gland at the base, grooved; leaflets 6-12 pairs, 1·2-2·8 by ·4-·7 in., lanceolate or narrow lanceolate, acuminate or acute; base somewhat unequal, glaucous beneath; lateral nerves about 4 on either half, rather obscure; petiolules very short. *Flowers* yellow, 1-1·5 in. across in short, axillary and terminal corymbose racemes, the whole often paniced at the ends of branches; pedicels ·2-·3 in. long, pubescent, elongating in fruit; bracts caducous, green, small, ovate, acute. *Calyx segments* ·3 in. long, greenish, elliptic or elliptic-ovate, pubescent outside. *Petals* about ·5 in. long, obovate or obovate-oblong, yellow with dark veins. *Stamens* 10, 3 or sometimes 4 sterile, lower 3 longest. *Ovary* hirsute. *Pod* 2·5-4·5 in. by ·2-·3 in., not

or scarcely depressed between the seeds, somewhat turgid and subterete, sutures more or less thickened.

KAMRUP, SIBSAGAR, KHASI & JAINTIA HILLS, 2,000-3,000 ft. and probably in other Districts also, not common. The leaves, roots and seeds are used medicinally similar to those of the last species.

Flrs. rainy season. Fr. cold season.

5. *Cassia hirsuta* Linn.

An annual or an undershrub about 4 ft. in height, all parts hirsute with dense spreading hairs. *Leaf rachis* 4-6 in. long with a solitary gland at the base; stipules subulate, .4-.6 in. long; leaflets 3-5 pairs, 1-2.5 by .5-.3 in., lower gradually smaller, ovate to oblong-lanceolate, acuminate; base unequal; petiolules very small. *Flowers* few together, .75 in. across on short peduncles, which are borne on upper leaf axils or are crowded at the ends of shoots. *Calyx segments* about .25 in. long, densely villous. *Petals* yellow, .3 in. long, oblong-obovate, obtuse, pubescent outside. *Stamens* 6-7, fertile, 2 longer than the others, 3-4 reduced to staminodes. *Ovary* densely villous. *Pods* hirsute, 3-6 in. long, slender, flattened; seeds broadly ovate.

A native of Tropical America, now naturalized in several parts of our area, e.g., KAMRUP, NOWGONG, DARRANG, probably in other Districts also.

Flrs. 10-11.

6. *Cassia Tora* Linn. Vern. *Bon-medelua*, *Dari-diga*, Ass.; *Taw-eit-nyang-synrang*, *Taw-blei*, Kh.; *Hadi-dika-arong*, Mik.

An annual attaining about 4 ft. with pubescent young parts. *Leaf rachis* 1.75-2.5 in., more or less puberulous with two subulate glands between the 2 lowest pair of leaflets, grooved; stipules linear, subulate, .3-.6 in. long; leaflets 3 pairs, gradually decreasing in size downwards 1-2.5 by .4-1.2 in., obovate or obovate-oblong, obtuse or subacute, minutely mucronate; base unequal, thin, glabrescent above, pubescent beneath; main lateral nerves 6-9 on either half; petiolule .1 in. long. *Flowers* yellow, .5 in. across, borne in pairs on very short axillary peduncles, one often abortive;

pedicels $\cdot 2 \cdot 25$ in. long, hirsute. *Calyx segments* $\cdot 2 \cdot 3$ in. long, ovate to elliptic, usually obtuse, ciliate and thinly pubescent in bud, glabrate with age. *Petals* $\cdot 4 \cdot 5$ in., obovate-oblong, prominently veined. *Stamens* 7, perfect, 3 reduced to staminodes. *Pod* 5-8 in. long, sub-tetragonous, imperfectly septate between the seeds; seeds sub-cylindric with obliquely truncate ends.

SIBSAGAR, KHASI and JAINTIA HILLS, KAMRUP, CACHAR, ascending to 2,500 ft. in N. CACHAR HILLS.

Probably all over the Province in waste land.

The leaves and seeds contain chrysophanic acid and are good remedies for skin diseases like ringworm, etc.

Flrs. rainy season. Fr. 11-12.

7. *Cassia bicapsularis* Linn. Vern. *Dieng-phareng*, Kh.

A shrub about 4 ft. in height. *Leaf rachis* with one or two glands between the lower pairs of leaflets; stipules early caducous, subulate, small; leaflets 2-4 pairs, $\cdot 7 \cdot 1 \cdot 2$ by $\cdot 4 \cdot 7$ in., obovate, obtuse or rounded at the top, glabrous, glaucous beneath, membranous; petiolules very small. *Racemes* peduncled, attaining the size of leaves; pedicels $\cdot 3 \cdot 5$ in. long. *Flowers* yellow. *Calyx segments* $\cdot 2$ in. long. *Petals* $\cdot 4$ in. long. *Pod* 3-5 in. by $\cdot 4 \cdot 6$ in., turgid, more or less cylindric, marked with fine horizontal lines.

A native of Tropical America, now run wild in many places in the KHASI HILLS in the vicinity of habitations, Shillong, Shangpung, Sohgympkor, Nongstoin.

8. *Cassia lævigata* Wild.

A handsome shrub with glabrous branches. *Leaf-rachis* 4-7 in. long with a gland between each pair of leaflets except the uppermost pair; stipules about $\cdot 25$ in. long, usually caducous; leaflets 3-5 pairs, $1 \cdot 7 \cdot 3 \cdot 5$ by $\cdot 7 \cdot 1 \cdot 2$ in., lanceolate, cuspidate-acuminate, glabrous, undersurface pale; petiolules minute. *Flowers* yellow, in a few flowered peduncled corymbose racemes, $1 \cdot 5 \cdot 3 \cdot 7$ in. long; bracts linear, acuminate, up to $\cdot 2$ in., caducous; pedicels $\cdot 3 \cdot 7$ in. long, glabrous. *Calyx-segments* $\cdot 2 \cdot 3$ in. long, unequal. *Petals* about $\cdot 5$ in. long, broadly abovate. *Stamens* 7, fertile, 2 longer than

others, 1 intermediate and 4 short; ovary glabrous. *Pod* 2.5-3 by .6 in., cylindric, stipitate at the base, turgid, marked with fine transverse lines. *Seeds* more or less compressed, obovate, about .25 in. long.

Originally introduced from tropical America and now naturalized in KHASI and JAINTIA HILLS, e.g. Borpani, Shillong, Cherrapunji, etc.

In the Khasi Hills specimens a gland is sometimes present between the upper most pair of leaflets.

Flrs. and Fr. almost throughout the year.

9. *Cassia alata* Linn. Vern. *Dadulhou*, Kuki & Tipp.; *Daudpata*, Syl.

A soft wooded shrub with thick downy branches. *Leaf-rachis* 9-24 in. long, stout, channelled with slightly margined ridges, but without glands; stipules persistent, about .3 in. long, rigid, deltoid, acuminate with auricled base; leaflets 10-12 pairs, 2-6 by 1-2 in., oblong, obtuse but apiculate with unequal base, subcoriaceous, glabrous on both surfaces or slightly downy beneath; lateral nerves 13-15 on either half, prominent beneath. *Racemes* 6-12 in. long, spiciform, stout, downy; pedicels short; bracts .7-1.2 in. long, prominent, enveloping the buds, caducous, usually obliquely obovate, membranous. *Calyx-segments* .4-.5 in. long. *Petals* bright yellow, .6-.7 in. long, obovate, veined, clawed. *Stamens* 7, fertile 2 longer than others. *Pod* 4-7 in. long, compressed, membranous with a crenulate wing about .4 in. broad along the middle of each valve.

CACHAR—opposite Lakhipur-Barak Reserve, SYLHET-Singla Reserve. GOALPARA-Makra, LAKHIMPUR-Jaipur, SIBSAGAR-Barpathar—apparently naturalized.

The leaves as the vernacular names indicate are considered to be good for ring worm.

Flrs. 9-12. Fr. 1-2.

10. *Cassia mimosoides* Linn.

Usually a diffuse, sometimes an erect undershrub, attaining 4 ft. often with spreading branches; branches, leaf rachis and inflorescence clothed with adpressed hairs. *Leaf rachis* 2-4 in. long, slender, with a sessile gland close to the

lower pair of leaflets; stipules $\cdot 25\text{--}\cdot 35$ in. long, subulate with a broad base. *Leaflets* 45-70 pairs, crowded and overlapping, $\cdot 15\text{--}\cdot 2$ in. long, subfalcately linear oblong, acute, obliquely mucronate, rigid, nerves somewhat prominent beneath, often with a few hairs near the margin on the undersurface. *Flowers* solitary or in pairs; pedicels axillary or extra-axillary, up to 1 in. long; bracts one pair at the base of the pedicels, about $\cdot 2$ in. long, resembling the stipules; bracteoles 2, a little below the calyx about half the size of the bracts. *Calyx-segments* $\cdot 15\text{--}\cdot 25$ in. long, unequal, long-ovate, acuminate, thinly pilose outside. *Petals* $\cdot 2\text{--}\cdot 25$ in. long, yellow, elliptic, obtuse. *Stamens* usually 10, alternately shorter. *Pod* 1.5-2 in. long, strap-shaped with scattered short hairs outside, septas between the seeds, oblique; seeds compressed, obliquely oblong.

KHASI HILLS—Borpani, Umsingkhla, near Nongstein, etc., about 3,000 ft., KAMRUP, probably in most districts.

The flowers are often borne on branches with aborted leaves which give the former appearance of terminal racemes.

The leaflets are sensitive show sleep movements.

6. CYNOMETRA Linn.

Cynometra polyandra Roxb. Vern. *Ping*, Cach; *Bonsuthai-buphang*, Kach.; *Chherasu*, Garo; *Dieng-rai-heh*, *Dieng-soh-pyda*, Khasi; *Nanop*, Manip.; *Korhai-ha*, Lushai, Kuki; *Bam-kung*, Tipp.; *Rang-koroi-ching*, *Thing-changleing-theing*, Naga.

A large evergreen tree; stem sometimes buttressed at the base. *Bark* dark-brown or grey, somewhat rough, fibrous, light pink or brownish inside. *Branchlets* lenticellate, shoots enveloped at first in imbricating scales, the lower small up to $\cdot 3$ in. across, upper membranous and longer. *Leaves* paripinnate, rachis 2.4-5 in. long, puberulous; leaflets 2-3 pairs, sessile, 2.4 by $\cdot 8\text{--}1.5$ in., lowest pair smallest, obliquely obovate-oblong, oblong-lanceolate or elliptic oblong, obtusely sub-acuminate; base unequally cuneate, inner side with straight margin, on the lower half, narrower than the outer half, subcoriaceous, glabrous on both surfaces; main lateral nerves 7-8 on either half, rather indistinct, meeting in loops near the margin. *Flowers* white, in axillary rusty pubescent

corymbs, 1-2 in. long, floriferous to the base, in bud enclosed by imbricating deciduous, hard, striate, scarious, broadly ovate scales, which are up to .3 in. across and more or less silky pubescent outside; pedicels .6-1 in. long, pubescent, with 2 caducous basal bracteoles up to .2 in. long; buds pubescent. *Calyx tube* very short, with a disk at the base; lobes 4, white, imbricate to obovate-oblong, ultimately reflexed, thinly pubescent outside, .3-.4 in. long. *Petals* 5, linear-oblong to oblanceolate, clawed, about .4-.5 in. long. *Stamens* 40-60, white; filaments slender, glabrous, about .5 in. long. *Ovary* densely woolly, subsessile, very oblique; style filiform; stigma capitate; ovules 1-2. *Pod* 1.5-2.5 in. by .75-1.25 in., falcate or oblique, oblong, woody, usually rather rugose with lenticular dots. *Seeds* solitary.

SYLHET, CACHAR, GARO HILLS, LUSHAI HILLS, KHASI HILLS, low elevations on slopes above SYLHET, Dibrugarh—N. Gill!

The timber is light red, hard, close grained. It is said to be useful for building and charcoal. Weight about 60 lbs. per c. ft. (G. Mann).

Flrs. 3-4. Fr. 5-6?

7. TAMARINDUS Linn.

Tamarindus indica Linn. The tamarind tree. *Tintiri*, *Amlika*, Sans. Vern. *Tentul*, Beng.; *Tetuli*, Ass.; *Imli*, Hind.; *Dieng-soh-tantai*, Kh.; *Thei-apai*, Kuki; *Khen-thiri*, Garo.

A large handsome evergreen tree with shallow fissured, dark-grey, rough bark. *Leaves* 2-5 in. long, even pinnate; stipules caducous (persistent in young plants), linear lanceolate. *Leaflets* 10-20 pairs, .4-.7 in. by .15-.2 in., linear-oblong; lateral nerves meeting in a more or less continuous, undulating line close to the margins, slightly notched at the apex, coriaceous, glabrescent; petiolules minute. *Racemes* lax, terminal, few flowered, up to 4 in. long. *Flowers* pale yellow or cream coloured, .5 in. long. *Calyx* segments lanceolate, lowest connate. *Petals* streaked with red, 3 only developed, lower reduced to scales. *Stamens* monadelphous below, only 3 perfect, rest reduced to 3-4 setaceous staminodes. *Ovary* stipitate, stalk adnate to the calyx tube. *Pod* indehiscent, 3-8 by 1 in., usually curved, somewhat compressed, pericarp crustaceous, brittle, scurfy;

seeds dark-brown, smooth, .5 in. across with hard testa imbedded in brown acid pulp, which is traversed by fibres.

Cultivated both for the fruits and as an ornamental tree, all over the province in the plains.

The pulp is largely eaten in curries and chutneys. It is believed to be refrigerent, digestive, carminative and laxative. An adhesive could be made from the seeds which yield considerable quantities of mucilage when steeped in water.

Flrs. 4-6. Fr. cold season.

8. SARACA Linn.

Saraca indica Linn. Syn. *Jonesia asoca* Roxb. *Ashok* Sans. & Beng. *Ahok*, Ass.; *Biardala* (Bridal plate) Cach.; *Asubuphang*, *Thaibor-phang*, Kach.; *Maikam-par*, Lushai, Kuki; *Bai-kang*, Tipp.; *Bok-bang*, *Khen-thiri*, Garo; *Mir-krem-arong*, Mik.; *Dieng-ja-mar-aih*, *Dieng-soh-kyrkha*, *Dieng-soh-rym-sein*, Khasi.

An umbrageous low branched middle sized handsome tree. *Bark* dark-brown to almost black, rough with lenticels, reddish-brown and fibrous inside. *Leaves* paripinnate, rachis 4-9 in. long, glabrous, leafy almost to the base, pulvinous corky and wrinkled, 4-9 in. long; stipules intrapetiolar, completely united, .35-.5 in. long, scarious, ovate-oblong, obtuse, ciliolate. *Leaflets* 3-6 pairs, 3-10 by 1-2.5 in., oblong-lanceolate to oblong, sub-obtuse to acuminate, coriaceous, glabrous, purplish pink and drooping when young, dark-green above when mature; base slightly unequal; main lateral nerves 8-12 on either half; petiolules short, stout, wrinkled; stipules deciduous. *Flowers* fragrant, orange scarlet, 1-1.5 in. long, in compact glabrous panicles of corymbs from leaf axils or nodes on old wood, rachis coloured; pedicels .3-.5 in. long, red; bracts deciduous, ovate, subacute; bracteoles persistent, 2 at the base of the calyx tube, .15-.2 in. long, spatulate, oblong, ciliolate, amplexicaul, coloured like the calyx. *Calyx* passing from yellowish orange to scarlet, petaloid; tube elongate, cylindric, .5-.75 in. long, crowned by the lobed disk, solid at the base; segments 4, subequal, .3-.4 in. long, obovate, oblong, ciliolate at least when young. *Petals* usually 0. *Stamens* 7-8, much exserted; filaments filiform; anthers

purple, versatile. *Ovary* more or less hairy on the sutures, stipitate, the stipe adnate below to side of the disk, pubescent; style curved, forming a complete ring; ovules many. *Pod* 5-10 by 1.75-2 in., compressed, tapering at both ends, coriaceous, glabrous, veined. *Seeds* 4-8, ellipsoid-oblong, 1.5 in. long, slightly compressed.

SIBSAGAR, NOWGONG, CACHAR, SYLHET, GARO HILLS (planted?) KHASI HILLS, low elevations on the slopes facing SYLHET plains. Planted and sometimes naturalized in UPPER ASSAM.

The wood is used for ploughs and shafts locally. The flowers and bark are medicinal. The former is considered to be an excellent uterine tonic. Fruits are chewed by Mikirs as a substitute for areca nuts.

A very beautiful tree when in flowers. The purplish pink new leaves appear at intervals. In cultivation sometimes few of the stamens are transformed to purple petals. In some forms the leaf rachis and stipules are puberulous, which thus approach var. *puberula* Prain.

Flrs. 2-4. Fr. 9.

Poinciana regia Bojr. Gold Mohur tree. Vern. *Radhachura*, Beng.

A large soft wooded fast growing handsome tree. *Leaves* large, feathery, 2-pinnate; pinnæ 11-18 pairs; stipules pectinate. *Flowers* gorgeous scarlet and orange; petals 2 in. or more long, orbicular with a long claw. *Pod* 1-2 ft. long.

9. BAUHINIA Linn.

Trees or shrubs, erect or climbing by means of circinate tendrils. *Leaf* usually more or less cleft at the apex, rarely of 2 leaflets, palmately veined; stipules various, usually caducous. *Flowers* more or less zygomorphic, in terminal or rarely axillary racemes, or in spreading or corymbose terminal panicles; bracts and bracteoles small, often caducous. *Calyx tube* tubular or turbinate, lined by the disk; limb entire and spathaceous with 5 teeth or cleft into lobes. *Petals* 5, subequal, uppermost petal being innermost. *Stamens* 10, often 5 or more reduced to staminodes; filaments free; anthers versatile, dehiscing longitudinally. *Ovary* stalked, many ovuled, stipe free or adnate to the sides of the calyx tube; style short or filiform. *Pod* linear or oblong, flattened, coriaceous or woody, continuous within or rarely septate, dehiscent or indehiscent. *Seeds* orbicular or ovate, compressed, albuminous.

I. Fertile stamens 10 :—

Calyx spathaceous; flrs. large; an erect shrub; leaves not acid.

1. *B. acuminata*.

Calyx of 5 segments; flrs. small; a moderate sized tree; leaves acid.

2. *B. malabarica*.

II. Fertile stamens 3 or sometimes 4-5 :—

A. Erect trees :—

Flrs. when leafless or nearly so; flr. buds not angled; fertile stamens 5, rarely less.

3. *B. variegata*.

Flrs. after leaves; flr. buds sharply angled; fertile stamens 3, rarely more.

4. *B. purpurea*.

B. Climbers :—

1. Branches not flat or ribbon like :—

a. Mature leaves more or less persistently pubescent at least on the under surface :—

Lobes of leaves obtuse.

5. *B. VahlII*.

Lobes of leaves acute or acuminate; (pedicels more slender than in *B. VahlII*).

6. *B. rufo*.

b. Mature leaves quite or nearly glabrous :—

i. Lobes of leaves more or less acute or acuminate :—

Flrs. in corymbs forming terminal panicles; petals hardly exserted; branches cirrhose only at the base; lobes of leaves subacute or bluntly short acuminate.

7. *B. khasiana*.

Flrs. in simple or branched racemes; petals exserted; branches with many tendrils; lobes of leaves acuminate.

8. *B. macrostachya*.

ii. Lobes of leaves more or less obtuse :—

Calyx tube about as long as the limb, or slightly longer; petals 1.2-1.5 in. long.

9. *B. nervosa*.

Calyx tube two to three times the limb; petals .5-.6 in. long.

10. *B. tenuiflora*.

2. Branches ribbon like, twisted in alternate directions :—

Flrs. very small, in copiously paniced racemes; calyx tube scarcely any. 11. *B. anguina*.

1. *Bauhinia acuminata* Linn. Vern. *Mati-katota*, Ass.; *Gainchhong*, Cach.; *Megong-aphal*, Garo.

An erect shrub attaining about 10 ft.; young parts pubescent. *Leaves* 3-5 in. long, slightly longer than broad, cleft about one-third way down into two acute or subobtusate lobes; base subcordate to nearly truncate, 9-11 nerved, glabrous above, finely pubescent beneath, thinly coriaceous; petiole .7-1.5 in. long, pubescent; stipules subulate with acuminate tip, .3-.6 in. long. *Flowers* white, 2.5 in. across, in short leaf opposed racemes; bracts and bracteoles linear pubescent, the latter .2-.4 in. long, sometimes up to .5 in.; pedicels .5-.8 in. long. *Calyx* 1-1.5 in. long, tube short; limb spathaceous, acuminate, with setaceous teeth. *Petals* 1-1.75 in. long, elliptic with prominent midrib and ascending veins. *Stamens* 10, fertile. *Ovary* stipitate. *Pod* glabrous, 3-5 by .5-.7 in., beaked, tardily dehiscent. *Seeds* 5-8, flat.

Rani Reserve—KAMRUP, N. CACHAR HILLS, Mupa Valley, GARO HILLS—N. Range, Bhumeswar Hill—GOALPARA. Often cultivated in gardens.

Flrs. 4-5.

2. *Bauhinia malabarica* Roxb. Vern. *Kotra*, *Tengakotra*, Ass.; *Bakbakhol*, *Migong-thak*. Garo; *Mugung-laphang*, *Mugung-glap-gig*, *Pakhri*. Kach.; *Hanthar*, *Kuthor-arong*, *Hanthar-arong*, Mik.; *Waithur*, Kuki; *Khormang*, Mech; *Dieng-thar-lang-jou*, *Dieng-thar-lang-soh*. Kh.; *Takikural*, *Tangi*, Nep.

A moderate sized tree with bushy crown; bark dark-brown or grey, exfoliating in thin long rectangular flakes, fibrous and red in side, about .75-1 in. thick; young parts pubescent. *Leaves* acid, broader than long, 1.5-4 by 1.8-2.5 in., cleft about a fourth of the way down into two rounded lobes, 7-9, sometimes 11 nerved, cordate subcordate or less often, subtruncate, coriaceous, glabrous above, glaucous and glabrate beneath; petiole .8-1.4 in., swollen

at both ends, rusty pubescent. *Flowers* dull white, .5 in. long. *Racemes* axillary and terminal, 1.5-2.2 in. long, often 2-3 together, sometimes branched from near the base; buds ovoid; pedicels slender, .4-1 in. long, jointed below the calyx, tomentose; bracts and bracteoles minute. *Calyx* brown, tomentose; tube .3-.5 in. long; lobes 5, slightly longer, linear, subulate. *Stamens* 10, alternately longer and shorter. *Ovary* pubescent; style produced. *Pod* 7-14 by .7-1 in. on a stalk 1 in. long, flat, flexible, straight or sub-falcate, beaked, marked when dry with more or less reticulate raised lines, which descend obliquely from the middle of the valves to the sutures. *Seeds* 20-30, ovoid, globose, .2 in. long, dark-brown, polished.

GARO HILLS, KAMRUP, NOWGONG, GOALPARA, N. CACHAR HILLS, KHASI HILLS, up to 2200 ft.—Nongpoh, Umling forest Road etc.; SIBSAGAR.

About 320 seeds weigh 1 oz.

Flrs. 8-10. Fr. 1-5.

3. *Bauhinia variegata* Linn. *Kanchanar*, Sans. vern. *Tulla*, *Kanchon*, Sylh.; *Bogakatra*, *Kurol*, *Kotora*, Ass.; *Darichiksam*, *Bol-migong*, *Migong*, Garo; *Kolka*, *Jharua*; *Mukhunglap-baphang*, *Kural-bi-phang*, *Mugam-galap*, Kach.; *Mai-hou-lei*, Manip.; *Chinghau*, Nep.; *Wai-bi*, *Vaibeh*, Kuki; *Inku-arong*, Mik.; *Dieng-tharlong*, *Dienglong*, Khasi; *Baije*, Lushai; *Khormang*, Mech.

A moderate sized tree with dark grey or brown somewhat rough bark; shoots tomentose when young. *Leaves* 2.6-6 in. long, as broad as long or sometimes broader, usually deeply cordate, 11-15, nerved, thinly coriaceous, glabrous and dull green above, grey glaucous and puberulous along the nerves beneath, cleft through about a quarter or third the length; lobes obtuse or rounded; petiole 1-1.5 in. long. *Flowers* large, pure white, pink or purple, 2-3 in. across when fully opened, in few flowered corymbose grey pubescent racemes, from leafless axils or terminating lateral shoots; pedicels very short or 0, stout; bracts and bracteoles very small deltoid. *Calyx* covered with grey and somewhat sticky pubescent tube. .5-1 in. long, slender; limb spathaceous, 5 toothed at the apex, .6-1.2 in. *Petals*

1·5-2 in. long, obovate or obovate-oblong; base clawed, with distinct midrib and ascending veins, glabrous, 4 white and 1 coloured or in 4 pink and 1 deeper purplish-pink or in some—cultivated forms 4 pure white and one with yellowish centre (*B. candida* Roxb.). *Stamens* usually 5, rarely fewer; filaments stout, unequal, incurved. *Ovary* with a long stipe which is extruded ·5-·7 in. beyond and adnate at the bottom to the calyx tube, covered with mealy pubescence and with spreading hairs along the sutures; style short. *Pod* 6-10 by ·7-·9 in., hard, flat, glabrous, prominently veined when dry, slightly falcate, dehiscent. *Seeds* 10-15.

Throughout the Province ascending to 2500 ft. in the KHASI HILLS, more common in hilly country.

The flower buds are curried and eaten, the leaves are good fodder, often cultivated for its handsome flowers.

About 70-100 seeds weigh 1 oz.

Flrs. 2-4, when nearly leafless or leafless. Fr. rainy season.

4. *Bauhinia purpurea* Linn. Vern. *Kurial*. Ass.

A moderate sized tree; bark greenish, ashy-grey or dark-brown, somewhat rough on old stems, inside pinkish white with streaks of brown; young parts brown pubescent. *Leaves* 3-6 in. long, rather longer than broad, cleft about third to half way or more down, rather thin but tough, glabrous above, glabrate or minutely puberulous on the nerves beneath; base cordate, less frequently truncate, 9-11 nerved; lobes narrowed towards the apex, acute or sub-acute at the tip, sometimes slightly overlapping on the inner margin; petiole 1-1·6 in. long, swollen at both ends. *Flowers* rose purple in few flowered terminal, corymbose or paniculate brown tomentose racemes; pedicels ·2-·5 in. long, tomentose; buds acutely 5-angled. *Calyx* tomentose; bracts and bracteoles very small, deltoid, tomentose; tube ·3-·4 in. long; limb spathaceous, usually splitting into two segments, nearly twice as long as the tube. *Petals* 1·5-2 in. long, oblanceolate, long clawed, with distinct midrib and veins. *Stamens* usually 3 fertile, slightly shorter than the petals; staminodes unequal. *Ovary* downy with a long stipe. *Pod* 6-10 by ·6-·8 in. on a tomentose stipe, which is ·6-1 in. long, slightly falcate, flat, greenish purple, pubescent along the

sutures, tardily dehiscent. *Seeds* 12-15, flattened, roundish, dark-brown, smooth.

Very ornamental when in flower for which it is sometimes cultivated.

KAMRUP, GOALPARA, LAKHIMPUR, etc.

Heartwood reddish-brown, moderately hard, fairly close grained, suitable for agricultural implements and building where not exposed. The leaves are fair cattle fodder. The bark could be used for tanning.

Flrs. 9-11. Fr. 1-3.

5. Bauhinia Vahlia W. & A. Vern. *Nak-kati-lewa*, Ass.

A gigantic climber, often with irregularly fluted stem showing on cross section irregular masses of xylem tissue, arranged roughly in a floral pattern separated by masses of bark-like tissue. *Branchlets* often ending in a pair of tendrils; young parts, petioles and leaves beneath, specially along the nerves, densely rusty or rarely greyish tomentose. *Leaves* very variable in size, usually 4·5-18 in. across, sometimes smaller, as broad as long or broader, cleft through about a third of the length; lobes obtuse rounded, thin but tough, dark-green and glabrescent above, more or less downy beneath; base deeply cordate, 11-15 nerved; petiole 2·5-6 in. long, swollen at both ends stout; stipules ovate oblong, obtuse, about ·2 in. long. *Flowers* 1·5-2 in. across, white or cream coloured, in terminal woolly corymbs or corymbose racemes; pedicels 1-2·5 in. long, densely tomentose-like the calyx with lanceolate caducous; bracts at the base ·15-·2 in. long, and a pair of small linear and bracteoles above the middle. *Calyx* tube ·2-·3 in. long, slender; limb ·4-·5 in. long, 5 toothed, irregularly splitting into two broadly ovate, reflexed lobes. *Petals* ·8-1·2 in. long, obovate or oblanceolate, silky pubescent outside along the back; margins crisped, glabrous. *Fertile* stamens 3. *Ovary* densely woolly, stipe adnate to calyx tube, densely woolly; style glabrescent towards the apex. *Pod* 5·5-12 by 1·75-3 in., flat, woody, rusty, velvety. *Seeds* 8-12, about 1 in. across.

GOALPARA, KAMRUP, and probably in other forests.

The bark yields a tough fibre which is used for cordage, the leaves are used as plates, the pods are roasted and the seeds eaten.

Flrs. 4-6. Fr. cold season.

6. Bauhinia rufa Grah. Vern. *Hambiokalik-arong*, *Hambi-okalik-arikang*, Mik.

A large cirrhose climber, climbing tall trees. *Young* shoots, inflorescence, petioles, pedicels and outer surface of calyx densely ferruginous, tomentose, cirrhi axillary, ultimately becoming stout and woody round their supports. *Leaves* 3·7-8·5 by 3-7·5 in. near the inflorescence, incised about a third way down, sinus deltoid; lobes usually with an acute or shortly acuminate rarely sub-acute tip, glabrous when mature above, pubescent atleast along the nerves beneath, thinly coriaceous; base cordate to subtruncate, 9-11 nerved; petiole up to 5·2 in., swollen at both ends; stipules about ·3 in. long, subfalcate. *Flowers* white in terminal corymbose racemes; pedicels 1-1·8 in. long, more slender than in *B. Vahlii*; bracts ·25-·35 in. long, linear, acuminate, persistent. *Calyx* tube ·25-·3 in. long; limb 3-4 in. long, irregularly split, ultimately reflexed. *Petals* ·7-·8 in. long, suborbicular-obovate to broadly spatulate with crisped margins, long clawed, densely silky on the back; fertile stamens about 3. *Ovary* densely silky, shortly stipitate; style long, glabrous. *Pods* not seen.

SIBSAGAR—Borpathar, Jamguri, Kaloni forests, etc., N. E. FRONTIER, Sarpo Valley, LUSHAI HILLS.

Flrs. 4.

7. Bauhinia khasiana Baker.

A large climber, often deeply fluted; branchlets cirrhose only at the base, angled, coppery silky when young. *Leaves* 3·5-7 by 3-6 in., ovate or suborbicular in outline, cleft about a third or fourth way down into sub-acute or bluntly short acuminate; lobes thinly coriaceous, glabrous, strongly 7-9 nerved, widely cordate or truncate; petiole 1·25-3 in. long, smaller near the inflorescence, glabrescent with age, swollen at both ends. *Flowers* in corymbs 2-5 in. long, several together forming a terminal spreading panicle; the lower branches of which are sometimes form upper leaf

axils, densely covered when young like the pedicels and the calyx with ferruginous silky hairs; bracts .2 in. long, ovate-lanceolate, caducous; pedicels 1-1.5 in. long, slightly dilated upwards. *Flowers* .5 in. across, brownish-red. *Calyx tube* .25-.3 in. long, sub-cylindrical, sharply kneed in open flowers; limb about the same length, irregularly split, rosy inside. *Petals* about .35 in. long, oblanceolate or obovate, densely silky outside with reddish-brown pubescence, sparingly so inside. *Stamens* usually 3 fertile; filaments tapering, glabrous, red. *Ovary* densely pubescent along the sutures, shortly stipitate. *Pod* not seen.

KHASI HILLS, e.g. Um Eu (beyond Barpani), Suntong, Watt!
Flrs. 7.

Bauhinia piperifolia Roxb. Syn. *B. glabrifolia* Baker. in F. B. I. in part. *B. Lucida* Wall.

A large cirrhose climber; young shoots silky pubescent, tendrils axillary, forked and curled. *Leaves* ovate in general outline, entire at the ends of shoots, cleft along a fifth to a third at apex and the whole way down in young plants and root shoots, chartaceous, glabrous when mature; base broadly cordate to subtruncate, 9-11 nerved, 7-nerved in upper leaves; petiole 1-4 in. long, swollen at both ends. *Flowers* .4-.5 in. across in many short peduncled dense flowered corymbs at the ends of branches, all together forming terminal corymbose panicles; corymbs 2.5-3.5 in. long, brown or grey (?), silky tomentose like the pedicels and calyx. *Bracts* minute, lanceolate, caducous; bracteoles minute, early deciduous; pedicels slender 1-1.2 in., broader upwards. *Calyx tube* about .15-.2 in. long; limb .25 in. long. *Petals* .25-.3 in. long, obovate, clawed, shaggy outside with brown hairs. *Stamens* 3 fertile. *Ovary* glabrous, short stalked style produced. *Pods* not seen, according to Roxburgh round or oval, glabrous, 1-2 seeded.

SYLHET, C. B. Clarke!

8. *Bauhinia macrostachya* Wall. Vern. *Ram-jakhola*, *Makhori-ghila*, Ass.; *Nagbeli*, Nep.; *Mugung-glap-jola-dukha*, *Jong-rak-kal-hrin-rang*, Kuki.

A large climber, usually with copious, stalked and 2-forked tendrils. *Leaves* 3-6 in. long, broadly ovate or suborbicular in outline, incised, $\frac{1}{6}$ th- $\frac{1}{4}$ th way down or upper leaves nearly entire; lobes acuminate, sometimes widely divergent; upper surface glabrous, puberulous along the nerves or glabrescent beneath; base broadly cordate, usually

9 nerved; nerves converging towards the apex; petiole 2-3 in. long, swollen at either end. *Racemes* 3-6 in. long, simple or branched, terminal or from upper axils; bracts small, deltoid like the pedicels and sepals, densely brown pubescent; pedicels .25-.5 in. *Calyx* campanulate; tube .25-.4 in. long, turbinate; limb .25 in. long, 5-cleft to about half way down; segments sub-regular. *Petals* exserted, about .5 in. long, pale yellow, obovate, long clawed, densely brown tomentose. *Fertile* stamens 3. *Ovary* densely ferruginous-woolly, shortly stalked; style short, glabrate towards the apex. *Pod* 4-6 in. by 2 in., flat, indehiscent, persistently tomentose, 2-4 seeded.—Hooker.

N. E. FRONTIER, LAKHIMPUR, CACHAR, NORTH CACHAR HILLS, SIBSAGAR, Garampani, Barpathar, Kankhowa, Merapani, etc., JAINTIA HILLS—Prain's collector!

Flrs. 4-5.

9. *Bauhinia nervosa* Wall. Vern. *Mi-jalong*, Khasi; *Hrui-wai-be*, Kuki.

A large cirrhose climber; young shoots pubescent; tendrils in pairs. *Leaves* 3-4.5 by 2-3 in., longer than broad, thinly coriaceous, glabrous above, puberulous along the nerves beneath, lobed less than half way down; lobes sub-obtuse; base 11-15 nerved, subcordate; petiole 1.7 in. long, shorter upwards; stipules .2-.4 in. long, obliquely oblong. *Flowers* white in elongate ferruginous pubescent terminal racemes; bracts and bracteoles spatulate, early deciduous; pedicels 1-2 in. long. *Calyx* pubescent outside; tube cylindrical, about 1 in. long; limb .7-.8 in. long, divided ultimately into oblong acute segments. *Petals* about 1.2-1.5 in. long, long clawed, white, fading to dun-brown, ferruginous, silky. *Fertile* stamens 3. *Ovary* clothed with dense brown or rufous silky pubescence, stipitate; style stout; stigma dilated, capitate. *Pod* 6-8 in. by 1.7-2 in., with thick valves, glabrescent, stipitate and often with a slender beak.

KHASI and JAINTIA HILLS up to 3,000 ft.; CACHAR.

***Bauhinia albo-lutea* Prain.** Syn. *Phanera albolutea* Miq. Vern. *Jermei-dieng-long*, Kh.

A climbing shrub; innovations rusty pubescent; tendrils few, glabrescent with age. *Leaves* 2·5-4 in. long, roundish, sometimes broader than long, cleft about $\frac{1}{3}$ way down; lobes usually subacute, dark green and glabrous above, more or less pubescent or ultimately puberulous beneath; base subtruncate, subcordate, or cordate, 11-13 nerved; petiole 1·5-2·5 in. long, swollen at both ends, puberulous; stipules ·2-·3 in. long, obovate-oblong or oblong-obtuse. *Flowers* in few flowered lax terminal corymbose rusty pubescent racemes, 3-4 in. long; bracts about 2 in. long, lower broadly ovate, narrower upwards; bracteoles subulate, ·15 in. long; pedicels ·7-1·5 in. long, rusty puberulous like the calyx; buds ·9-1 in. long, clavate. *Calyx* tube ·3-·45 in. long, dilated downwards to the base; limb ·65-·75 in. long, splitting into 5 reflexed, oblong-lanceolate lobes. *Petals* 1·25 by ·3 in., cream coloured, subequal, oblanceolate, subacute, clawed, pubescent outside along the lower third of the midrib and the claw. *Stamens* 3 fertile. Ovary stipitate, rusty, pubescent; style slender, glabrous. *Pod* not seen, "thin, oblong with black glabrous woody valves"—Prain. *Seeds* 2 (Miquel Flr. Ind. Bat. I, 1079).

KHASI HILLS, Hatmawadan.

Flrs. 9-10.

Bauhinia Championii Benth.

A large climber; young shoots and inflorescence densely pubescent. *Leaves* 2·5-4·5 by 2-3·5 in., cleft $\frac{1}{4}$ th way down into two obtuse or broadly subacute or bluntly short acuminate lobes, glabrescent above, thinly pubescent beneath; base about 7 nerved; petiole ·6-1 in. long. *Flowers* small, white, in elongate and usually branched racemes, which are axillary or terminate branches; bracts minute, early deciduous; pedicels ·2-·25 in. long, pubescent. *Calyx* pubescent; tube very short; limb about ·15 in. long, ultimately reflexed and 5-fid. *Petals* about ·2 in. long, clawed. *Stamens* 3 fertile, others rudimentary or absent. Ovary stipitate, glabrous or nearly so. *Pod* 1·75-2·5 in., thin, glabrous, 1-2 seeded with a slender stipe.

Brahmakunda—Masters!

Material incomplete for satisfactory determination.

10. *Bauhinia tenuiflora* Watt. ex Clarke in Journ. Linn. Soc. XXV. 18. Vern. *Nga-hiamba*, Naga; *Jong-rekal*, Kuki.

A large cirrhose climber. *Bark* dark or reddish-brown, pinkish inside; shoots and inflorescence clothed with copper coloured hairs when young; tendrils usually forked and axillary at the base of the shoots. *Leaves* 2-4 in. long, usually as broad as or sometimes broader than long, lobed, about $\frac{1}{3}$ th- $\frac{1}{4}$ th way down, thin, glabrate above, glaucous and often with scattered pubescence along the nerves beneath;

base truncate or broadly subcordate, with 7-9 nerves which end in loops near the margin; petiole 1-1.5 in. long; stipules falcate, .15-.2 in. long, early deciduous. *Flowers* white, in terminal and lateral many flowered corymbs; bracts subulate, .15-.2 in. long; bracteoles 2 on each pedicel, filiform, .1-.15 in. long, lower pedicels attaining 1 in., at first densely afterwards thinly pubescent like the calyx. *Calyx tube* linear, .6-1.2 in. long; limb about a half to a third of the calyx tube, greenish, ultimately reflexed, two of the lobes cohering to near the apex. *Petals* .5-.6 in. long, clawed, obovate or oblong-obovate above the claw, erose with scattered hairs outside. *Fertile* stamens 3. *Ovary* glabrous. *Pod* 5-8 by 1.5-1.75 in., glabrous, very thin, flexible, about 15-20 seeded. *Seeds* flat, about .2 in. across.

N. CACHAR HILLS, Jatinga, Mailongdisa, Haflong, KHASI HILLS, Mairung (?) Nartiang, NAGA HILLS, MANIPUR.

11. *Bauhinia anguina* Roxb. Vern. *Nagput*, Sylh.; *Deo-jokhola*, Ass.; *Dukhoi-akhlem*, Kach.; *Kipiadong-kam*, *Tiso-donri-rikang*, *Tiso-adon-arikong*, *Tisodonri*, Mik.; *Zongalei-lon*, Lushai; *Mei-lang-rih*, Khasi. "The snake climber."

A large climber, with flat ribbon like stems, twisted to form depressions on alternate sides; branchlets terete; tendrils few. *Leaves* 2.5-6.5 by 2.5 in., broadly ovate, almost entire on old plants, deeply lobed, sometimes almost to the base into acuminate or caudate lobes, in young plants or coppice shoots, chartaceous, glabrous; base broadly cordate, 5-7 nerved; petiole .6-1.5 in. long, glabrous. *Flowers* very small in racemes, 3.5-5 in. long, arranged in terminal panicles, often extending to the axils of upper leaves; pedicels up to .2 in. long, slender, at first pubescent, ultimately puberulous as are the axis of the inflorescence and its branches; bracts minute, subulate; buds globose. *Calyx tube* very short; limb about .07 in., 5-cleft. *Petals* .15 in., obovate, clawed, white, puberulous. *Fertile* stamens 3. *Ovary* stipulate, glabrous; style slender. *Pod* 1.2-1.5 in., indehiscent, obliquely oblong, often ending in a recurved tip, thin, flat, glabrous, 1-2 seeded.

Common. KHASI HILLS; LUSHAI HILLS, Tipaimukh; NOW-GONG, Dhansiri.

The bark is used in rope-making. The most regularly serpentine

pieces of the stems and large branches are carried about by numerous mendicants to keep off serpents.

Fr. 11.

Sub-family—3. MIMOSAOIDEÆ (Leguminosæ).

Trees, shrubs or woody climbers, rarely undershrubs or herbs. *Leaves* usually bipinnate, less commonly simply pinnate, sometimes pinnæ and leaflets reduced to one pair. *Flowers* small, regular, generally 5-merous, usually hermaphrodite, sometimes polygamous, usually in heads or spikes, sometimes in racemes or umbels; bracts small; bracteoles very small or 0, usually deciduous. *Calyx* more or less campanulate, truncate or valvately toothed or lobed, sometimes minute. *Petals* valvate, more or less connate into a tubular or funnel shaped corolla or free. *Stamens* as many or twice as many as petals or indefinite, free or monadelphous, sometimes adnate to the base of the corolla. *Ovary* free, 2-many ovuled. *Pod* dehiscent or indehiscent, sometimes many jointed. *Seeds* exalbuminous or albuminous, sometimes arillate.

I. Stamens definite, usually 8-10 :—

A. Flowers spicate; anthers usually with an apical gland, unarmed :—

Large climber with immense pod, septate between the seeds; seeds very large, dark reddish-brown. ..

1. Entada.

Erect tree, valves of pods spirally twisted when dehiscing; seeds scarlet.

2. Adenantha.

B. Flowers in heads; anthers without apical glands :—

Unarmed tree. Pod not breaking up into 1 seeded joints. ..

3. Parkia.

Prickly shrub or undershrubs.

Pod breaking up into 1 seeded joints.

4. Mimosa.

II. Stamens indefinite :—

A. Stamens free. Armed trees or shrubs.

5. Acacia.

B. Stamens monadelphous :—

1. Pods dehiscent not septate between the seeds :—

Unarmed trees; pod thin, flat, suture not thickened.

6. Albizzia.

Unarmed trees; pods twisted or

- | | |
|---|-------------------|
| circinate, unarmed (or sometimes armed in exotic species). .. | 7. Pithecolobium. |
| Trees or shrubs with weak or strong stipular spines, sutures of pod much thickened. | 8. Calliandra. |
| 2. Pods indehiscent, septate between the seeds. | 9. Enterolobium. |

1. ENTADA Adans.

Entada scandens Benth. Vern. *Gila*, Beng.; *Gila-lewa*, Bor-ghilla, Ghila, Ass.; *Gilar lot*, Ass. (Cach.); *Chhui*, Suebudu, Shuri, Garo; *Gila-lewa*, Mech; *Hambi-arikong*, Mik.; *Ther-kanup*, *Mei-nap*, *Mei-nok*, *Mei-keronath-dom*, Kh.; *Jermei-tang-nop*, *Tille-nop*, Synt.; *Papia-riube*, Miri & Abor; *Koy*, Lushai; *Poy*, Kuki; *Kangthro*, Manip.

An immense woody climber; stems angled and much twisted. *Bark* greyish-brown or blackish; blaze red, fibrous, green below the outer dead layers. *Innovations* and inflorescence brown, tomentose. *Leaves* 2-pinnate; rachis usually ending in a long bifid tendril or sometimes in a point; stipules small, bristle-like. *Pinnæ* usually about 2 pairs, 2-5 in. long. *Leaflets* 2-4 pairs, 1-3 by .6-1.5 in., obovate or oblong to elliptic, obtuse or bluntly short-acuminate, usually emarginate at the tip; base often oblique, glabrous, dark green and shining above, rigidly coriaceous; lateral nerves rather indistinct, about 7-8 on either half with similar intermediates, meeting in loops near the margin; petiolule about .1 in. long, pubescent. *Flowers* .1-1.5 in. long (excluding stamens), scented, small, pale yellow, crowded on elongate peduncled spikes, 5-7.5 in. long, axillary or paniced from the upper nodes of old leafless branches; bracts minute, linear. *Calyx* green, very small, campanulate, tomentose or pubescent outside, with 5 minute teeth. *Corolla* yellowish-green; petals 5, connate at the base, about .12 in. long, oblong-lanceolate. *Stamens* 10, free, exserted; anthers tipped with minute, deciduous, globose glands. *Ovary* subsessile with many ovules; style as long as the stamens; stigma concave, terminal. *Pod* woody, largest in the family in India, 1-3 ft. by 3-4 in., with thick sutures and a stout stipe, valves adpressed and jointed between the seeds; joints square or the terminal nearly

orbicular, breaking up from one another and the suture. *Seed* discoid, 1·5-2 in. across.

Throughout the Province in plains, ascending up to 1,500 ft.

The seeds contain saponin. They are made into a paste and used as a substitute for soap specially for washing the hair. The shell of the seeds is used for polishing the borders of *dhoties*.

Flrs. 4. Fr. 3-5, the flowering year.

In seedlings all the pinnæ are transformed into tendrils.

2. ADENANTHERA Linn.

Adenanthera pavonina Linn. *Kuchandana*, Sans.; Vern. *Dieng-thing*, Khasi; *Karli-arong*, Mik.

A handsome middle sized to large unarmed deciduous tree. *Bark* dark-brown or greyish brown, rough on old trees, white or brownish white inside. *Leaves* bipinnate, rachis usually 8-14 in. long but sometimes much longer; pinnæ 3-6 pairs, 3·5-7 in. long, puberulous or glabrescent; leaflets 6-16, alternate, ·8-2 by ·4-1 in., oblong to ovate oblong or elliptic oblong; apex obtuse or subtruncate, sometimes cuspidate; base cuneate, somewhat unequal, dark-green and glabrous above, glaucous and minutely puberulous or glabrescent beneath; main lateral nerves slender, rather indistinct beneath, 8-10, meeting in loops near the margin; petiolule ·1-·15 in. long. *Flowers* minute, 5-merous, greenish-yellow, ·1-·12 in. long in axillary short peduncled, puberulous, racemes, up to 7 in. long or in terminal panicles; pedicels a little shorter than the flowers in length, pubescent; bracts minute, caducous. *Calyx* minute, slightly pubescent or puberulous outside. *Corolla* pale yellow, puberulous outside; segments valvate, equal, connate at the base, linear or lanceolate, acute. *Stamens* 10, free, hardly exserted; anthers crested with deciduous glands. *Ovary* sessile, many ovuled; style filiform; stigma capitate. *Pod* 6-9 in. by ·6 in., flat, curved, valves spirally much twisted when opening. *Seeds* 8-15, bright scarlet, about ·3-·35 in long, convex on either side, round and lenticular or oblong.

SIBSAGAR, DARRANG, foot of KHASI and JAINTIA HILLS and low elevations on slopes above SYLHET-Shellia, Hatmawadan, Tharia, etc. Sometimes planted in gardens.

The seeds are strung into beads in other parts of India. They are supposed to weigh about 4 grains each and are also used as

weights. The heart wood is coral red, when freshly cut and turns purple on exposure, hard and durable.

Flrs. 3-5. Fr. 8-10.

3. PARKIA R. Brown.

Parkia Roxburghii G. Don. Vern. *Khorial*, Manipuri-*urohi*, Ass.; *Zongto*, Lushai; *Jongta*, *Jongcha*, Kuki; *Yongchak*, Manip.; *Jongcha*, Tipp., *Lonchak*, Sylh.; *Aoelgap*, Garo; *Barri-phang*, Cach.; *Themuk-arong*, Mik.; *Unkam-pinching*, Naga.

A middle sized unarmed tree with spreading branches and pubescent shoots. *Bark* light grey nearly white to brown with white patches, rough; blaze reddish brown with white lines. *Branchlets* with raised lenticels. *Leaves* 2-pinnate; main rachis puberulous or glabrescent, 12-24 in. long, with a gland below the lower pair of pinnæ and a few 1-5, between the upper pinnæ; pinnæ 8-30 pairs, opposite, secondary rachis 3-6 in. long; leaflets 40-80 pairs, close set, sessile, .3-·35 by .75-·1 in., linear oblong, falcately curved forwards, tip acute; base unequally truncate, lower half sub-hastate, dark-green above, puberulous on the margin; midrib prominent. *Flowers* in dense turbinate or clavate long peduncled heads, 1·5-2·25 in. long and .75-1·2 in. across; peduncled, 10-16 in. long, heads sterile towards the bottom; bracts upto .3 in. long, spatulate, silky pubescent outside. *Calyx* tubular, .25-·3 in. long, shortly 5-cleft; teeth tomentose, elsewhere glabrous. *Corolla* pale yellow, tubular, upper portion free; segments extruded above the calyx, sub-valvate. *Stamens* 10, exserted, the filaments connate below and adnate to the corolla tube; anthers narrow, not gland tipped. *Ovary* stalked; many ovuled; style filiform; stigma capitate. *Pod* 10-20 in. by 1·5 in., smooth, dark-brown, ultimately dehiscent.

SIBSAGAR, LUSHAI HILLS, CACHAR, SYLHET, GARO HILLS.
The tender pods are eaten. The timber is not used.

Flrs. 12.

4. MIMOSA Linn.

Mimosa himalayana Gamble Incl. *M. rubicaulis* in part.
Vern. *Kuchoi--kaitkusia-kant*, *Kauri-kanta*, Ass.; *Ingsu-maha*,

Su-ye-arong, Mik.; *Katasarkhi*, Mech; *Remsum*, Garo; *Rose*, Jharua.

A large shrub; bark smooth and reddish brown on young branches and pale brown and rough on older stems; branchlets grooved, thickly beset with straight or curved prickles, innovations brown tomentose. *Leaves* bipinnate; rachis 4-9 in. long, prickly, at first downy, glabrescent with age ending in a stiff bristle; stipules $\cdot 2\text{--}\cdot 25$ in. long, subulate; pinnae 8-12 pairs, often with a short stiff bristle between each pair, ending in a short bristle. *Leaflets* 10-20 pairs on each pinna, lowest pair often reduced to bristle, $\cdot 25\text{--}\cdot 3$ in. long, oblique, oblong; midrib terminating in a stiff point, glabrous and dark-green above, paler and sparingly hairy beneath. *Heads* $\cdot 4\text{--}\cdot 6$ in. across on downy peduncles, 1-2 in. long, which are either fascicled on leaf axils towards the ends of branches or arranged on terminal panicles. *Flowers* pink or white, tetramerous; bracts minute, linear, spathulate, hairy outside. *Calyx* campanulate, shortly toothed. *Corolla* $\cdot 1$ in. long; lobes about $\cdot 04$ in. long; stamens 8; filaments filiform, free, much exserted; anthers not gland tipped. *Ovary* glabrous, stipitate, many ovuled; style filiform; stigma terminal, entire. *Pod* 3-5 in. by about $\cdot 4$ in., slightly curved, smooth, 6-10 jointed; joints broader than long, 1-seeded, breaking up and separating from the persistent sutures.

LAKHIMPUR, DARRANG, KAMRUP, NOWGONG, SIBSAGAR, GARO HILLS, GOALPARA, CACHAR, often in clearances and old Jhum.

Flrs. 7-9. Fr. 11-1.

The plant occurring in our area appears to be intermediate in some respects between Gamble's *M. himalayana* and *M. rubicaulis* F. B. I. On the whole it is closer to *M. himalayana* which name has therefore been adopted first.

Mimosa pudica Linn. The sensitive plant. *Varah-kranti*, *Laj-jalu*, Sans.; *Lajjabati*, Beng.; *Sharmina*, *Chaitemara*, Beng. (Sylh.); *Adoribon*, *Nilaji-bon*, Ass.; *Lajula-pata*, *Lajura*, *Jharua* (Garo Hills); *Samukchhip*, Garo; *Suji-gablau*, Cach.; *Chiekambi*, Kuki; *Kombat-samthia*, *Synteshiuh*, Khasi; *Non-mek-jang*, Mik.

A straggling and spreading deciduous undershrub; stem and branches prickly and clothed with bristles. *Leaves* sensitive; pinnae 4, digitately arranged, 1-3-5 in. long; common petiole beset with ascending bristles; stipules linear-lanceolate with bristly edges; leaflets

12-20 pairs, .3-.4 in. long, obliquely narrow oblong, acute, undersurface adpressed bristly. *Heads* .4-.5 in. across, pink on slender, axillary peduncles, .7-1 in. long, covered with spreading bristles. *Flowers* with the stamens about .1 in. long. *Stamens* 4, much exserted. *Pod* with weak prickles on the sutures, .6-1 in. long; joints 3-5.

A common waste land weed. Originally said to have been introduced from TROPICAL AMERICA.

The roots are used medicinally.

Flrs. 7-11. Fr. 11-12.

5. ACACIA Willd.

Trees or shrubs, sometimes climbing, usually spinose or prickly.* *Leaves* bipinnate,† usually with a gland towards the base of the primary rachis and often several between the pinnæ; stipules sometimes transformed into spines; leaflets small. *Flowers* in globose heads or cylindrical spikes, hermaphrodite or polygamous, usually 5-merous. *Calyx* usually campanulate, shortly toothed. *Petals* valvate, exserted, more or less united in the lower half. *Stamens* indefinite, much exserted, free or connate with one another and to corolla at the base; anthers minute. *Ovary* sessile or stipitate; ovules many; style filiform; stigma minute, capitate. *Pod* dehiscent or indehiscent, often compressed and dry, rarely turgid, subcylindric or moniliform, never breaking up into joints; sutures not thickened, wavy or straight.

I. Erect trees or shrubs with stipular thorns :—

Flowers in heads; prickles straight. 1. *A. Farnesiana*.

Flowers in elongate spikes; prickles curved. 2. *A. Catechu*.

Var. *catechuoides*.

II. Climbers with scattered prickles; flrs. in paniced heads :—

A. Pods dehiscent, flat, thin.

1. Rachis with a solitary gland below the pinnæ :—

Stem terete; leaflets attached at the base near the upper edge :—

Branchlets pruinose. 3. *A. pruinescens*.

Branchlets not pruinose. 4. *A. pennata*.

Stem fluted; leaflets attached at the base about the middle :—

Leaflets close and touching,

* The introduced Australian Acacias have no thorns.

† In many of the Australian Acacias reduced to phyllodes.

- 1-nerved, the second nerve
weak and scarcely reaching
half-way up the leaflet. .. 5. *A. Gageana*.
Leaflets not touching, strongly
2-nerved to near the apex. .. 6. *A. oxyphylla*.
2. Rachis with two conical glands
below the pinnæ. .. 7. *A. diadenia*.
B. Pods indehiscent, with thick fleshy
saponaceous valves. .. 8. *A. concinna*.

1. Acacia Farnesiana Willd. Vern. *Tarua-kadam*, Ass.

A thorny shrub or a small tree with smooth dark brown bark and zig-zag lenticellate branches; young shoots downy. *Spines* stipular, straight, .25-.6 in. long, ashy-grey. *Leaf rachis* 1-3 in. long, pubescent, with a small gland at about the middle of the petiole and ending in a bristle; pinnæ 2-8 pairs, up to 1.2 in. long, terminated by minute bristles. *Leaflets* 10-20 pairs, minute, rigid, up to .25 in. long, oblong, acute, glabrescent. *Flowers* yellow, very fragrant in pedunculate heads, .4-.6 in. across; peduncles up to 1.2 in. long, pubescent, fascicled on leaf axils on minute excrescences with a ring of minute, ciliate bracts at near the top. *Calyx* campanulate, minute. *Corolla* small with short obtuse teeth. *Pod* 1.5-3 in. long, brown, slightly curved, somewhat inflated and subcylindric, marked with diagonal striæ, which meet in the middle. *Seeds* in two rows, immersed in pulp.

A native of Tropical America, often planted, sometimes self sown. The flowers are used in perfumery. The pods and roots are said to be rich in tannin.

Flrs. 9-4. Fr. 4-7.

2. Acacia Catechu Willd. Var. *catechuoides* Wall. Vern. *Khayer*, Beng.; *Khair*, Hind. Ass. & Nep.

A middle sized, often gregarious deciduous tree with rough brown, sometimes grey, at least partly, rarely black furrowed bark exfoliating in narrow strips, which remain attached for a long time, about .5-.6 in. thick; blaze red with fine white lines, deeper layers near cambium, pale yellow, fibrous; young shoots downy, spines stipular in pairs at the base of the leaf recurved, up to .2 in. long, flattened, dark-brown. *Leaf rachis* 2.5-7 in. long, puberulous or pubescent with one large cupular gland near the base and

2.5 between the upper pinnæ; pinnæ 10-30 pairs up to 1.7 in. long; leaflets about .15 in. long, ligulate, usually 30-50 pairs, sometimes fewer or more; petiolule minute. *Flowers* creamy white, .15 in. long in axillary pubescent spikes, 2.5 in. long; peduncle .5-.7 in. long. *Bracts* slightly exceeding the buds, boat-shaped, caducous, nearly glabrous, ciliate on the margins. *Calyx* ultimately glabrous, teeth deltoid. *Corolla* 2-3 times the calyx; lobes glabrous in mature flowers. *Pod* 3.5 by .5-.7 in., stipitate, flat, dark-brown, shining, sometimes constricted between the seeds; apex narrowed or subulate, 3-8 seeded; seeds flat, orbicular, .2 in. across.

Sadiya, DARRANG, KAMRUP, GOALPARA, etc., along streams, usually on recent alluvium.

The heartwood is dark red, very hard and durable, seasons and polishes well. Pores usually filled with cutch. Cutch and katha (khair) are obtained by boiling chips of heartwood. The wood yields a superior charcoal.

Flrs. 4-6. Fr. 11-2.

A. Cathecu Willd—differs from our plant by having a more hairy rachis, calyx and petals, which are covered with spreading hairs. This may be found in Goalpara. Some of the sheets collected from the District have rather densely pubescent rachis and thinly pubescent or puberulous calyx and petals and thus would seem to occupy an intermediate position between the two.

A. Suma Kurz. Vern. *Sankanta*, Beng.

A medium sized tree, resembling the last, with white bark. *Branches* flexuous; branchlets and rachis downy with white or greyish pubescence; spines paired, stipular, short, hooked, sharp, downy when young, afterwards brown. *Leaves* 4-10 in. long with a large oval cup-shaped gland near the base of the petiole and smaller circular glands between the upper pinnæ; pinnæ 10-20 pairs; leaflets 20-50 pairs, .25-.35 in. long, linear-oblong, usually ciliate. *Flowers* white or pale yellow, very small in axillary lax spikes. *Pod* 3.5 by .5-.75 in., pubescent when young.

Sometimes planted in gardens in our area.

Flrs. 8. Fr. 12.

3. Acacia pruinescens Kurz. Vern. *Rampet-riubi*, Miri and Abor.; *Kachoi-lata*, Ass.; *Te-bam*, Naga; *Sujidoukha*, Cach.; *Shitli*, Kh.

A large climber armed with more or less recurved prickles; branches pruinose. *Leaf rachis* 5-10 in. long, with

a large gland, 1-1.5 in. from the base and smaller ones between the upper 2 or 3 pinnæ, glabrous; stipules deciduous; pinnæ 8-15 pairs, 2.5-4 in. long; leaflets 40-60 pairs, closely crowded, .25-.4 in. long, sessile, linear oblong, with the midrib close to the upper edge, subacute to obtuse at apex; base semicordate to truncate, glabrous or ciliate on the margins, pale beneath. *Heads* yellow, .4-.5 in. across, arranged in axillary panicles, which are at first pubescent, the basal portion becoming pruinose with age. *Bracts* .2-.35 in. long, linear-lanceolate to acuminate-spathulate, tomentose. *Pedicels* usually in fascicles in the axils of bracts, .4-.7 in. long, tomentose. *Calyx* up to about .08 in. long, broadly campanulate; teeth short, acute, more or less pubescent at the tips, otherwise glabrous. *Corolla* exceeding the calyx; lobes lanceolate, puberulous. *Ovary* glabrous. *Pod* not seen.

N. C. HILLS, KHASI HILLS upto 2,500 ft., N. E. FRONTIER, LAKHIMPUR, SIBSAGAR, GARO HILLS.

Flrs. 4.

4. *Acacia pennata* Willd. Vern. *Sujai-lewa*, *Bon-siri*, Mech.; *Boloa-lot*, Slyh.; *Kuchai*, Ass.; *Sirengkhi*, *Shil-khing* or *Ser-khing*, *Remsu*, Garo; *Ther-chi-kli*, *Soh-mysiang*, Kh.; *Jermai-sheih-lyng-kshiah*, Synt.; *Suji-phang*, Cach.

A large prickly climber. *Bark* dark brown to grey, often with horizontal cracks; blaze pink to red, fibrous; branches with about 5 rows of small more or less recurved prickles. *Young* shoots, inflorescence, leaf rachis and pinnæ pubescent. *Leaf rachis* up to 9 in. long with a large cup-like gland near the base and 2-4 smaller between the upper pinnæ, usually prickly. *Pinnæ* 7-16 pairs, 1.5-4 in. long. *Leaflets* from 16 pairs in the lower pinnæ to 30-50 pairs in the middle pinnæ, closely set, often overlapping, .15-.3 in. by .03-.05 in., linear-oblong, unequally broad, sharp acute, midrib starting from near the upper margin at the base to nearly median at the apex, glabrous or nearly so. *Flowers* pale white in pedunculate heads, which are .3-.4 in. across; peduncles 1-4 together, .4-.7 in. long, downy on large terminal leafy panicles. *Calyx* glabrous. *Pod* 4-6 by 1-2 in., strap-shaped, reddish to dark-brown and shining when

mature, sutures thickened; base usually narrowed to a short stalk; apex usually shortly beaked; seeds 8-14.

DARRANG, KAMRUP, SIBSAGAR, CACHAR, SYLHET, GARO HILLS, GOALPARA, KHASI HILLS in low elevations, probably also NOWGONG.

The bark is used for poisoning fish.

Flrs. 7-9. Fr. cold season.

5. *Acacia Gageana* Craib. Kew Bulletin 1915 p. 409, Incl. *A. cæsia* Willd. in part.

A large prickly climber with spirally fluted stem; branchlets with 5 lines of prickles, striate; young shoots, rachis and inflorescence pubescent; prickles hooked, small. *Rachis* prickly, up to 7 in. long, with a large circular gland at the base of the petiolar portion and 1-3 glands at the base of the upper pinnæ. *Pinnæ* 7-14 pairs, 1-4 in. long, sometimes with 1-3 glands between the uppermost leaflets; leaflets (6-) 20-30 (-40) pairs, close and usually touching, subsessile, falcate, oblong, obliquely mucronate with the point directed forwards; base truncate, more or less ciliate, glabrous above, hairy on the nerves beneath, .25-.45 by .07-.15 in. with one prominent nerve, the other basal nerves weak and scarcely reaching half way up the leaflet. *Flowers* in paniced heads, lower branches of which arise in upper leaf axils. *Heads* 20-30 flowered; peduncles .4-.7 in. long, 1-4 together; bracts subulate to linear; bracteoles smaller than the calyx, minutely pubescent, somewhat boat-shaped. *Calyx* up to .1 in. long, teeth slightly hairy at the apex. *Corolla* .9-1.2 in. long, glabrous. *Ovary* stipitate, glabrous, pubescent after fertilization. *Pods* pubescent when young, glabrous when mature, thin, variable in size and shape, sometimes with irregular indentations between the sutures, 3.7-6.5 by .8-1.2 in.

Not common, Jenkins! District not mentioned.

Flrs. 10. Fr. later part of cold season.

6. *Acacia oxyphylla* Graham ex Craib, Kew Bulletin (1915) p. 409. Vern. *Sue*, Mik.; *Pochui-kant*, *Kecheri-kaint*, Ass.; *Mei-suai*, Kh.

A large woody prickly climber with fluted stem; young

parts grey or brown pubescent. *Rachis* 4-6 in. long with a conspicuous raised, flat-topped gland near the base and another small one between the uppermost pairs of pinnæ. *Pinnæ* (3-) 6-9 pairs, usually up to 3 in. long, often with a minute gland between the uppermost pairs of leaflets. *Leaflets* 8-24 pairs, usually 12-20 pairs not touching, .3-.5 by .1-.12 in., obliquely oblong, acute with the apex directed forwards; base rounded or subtruncate, 4-5 nerved, the one next to the midrib, just falling short of the apex, remaining basal nerves rather weak and somewhat obscure, ciliate on the margins at least when young, glabrous above, glabrescent or very inconspicuously adpressed pubescent beneath; petiolule 0 or minute. *Flowers* white, 40-50 together in heads, arranged in a terminal panicle extending into the upper leaf axils. *Peduncles* .4-.6 in. long, pubescent; bracts up to about .25 in. long, lanceolate, acute or acuminate, longitudinally nerved; bracteoles oblong, glabrous or nearly so. *Calyx* .08-1 in. long, glabrous or slightly pubescent in the lower portion. *Corolla* .1-.12 in. long, glabrous or nearly so. *Ovary* hairy on a glabrous stipe. *Pod* 4-7.5 in. by .75-1.2 in., breadth unequal, darkish-brown and soon glabrous.

SIBSAGAR, N. E. FRONTIER DISTRICT, SYLHET, Saikh-mokim, LUSHAI HILLS—Prazer, Gage; foot of KHASI HILLS—Tharia, probably throughout the province, extending to low elevations, fairly common.

Flrs. 10. Fr. later part of cold season.

7. *Acacia diadenia* Parker. Indian Forester Vol. V. (1929) p. 332. Vern. *Kelle-doukha*, Cach.; *Sulu-rikong*, Mik.

A large woody climber with fluted stem; branches with about 5 lines of prickles. *Bark* grey, thin, yellowish inside. *Young* shoots, *rachis* and inflorescence more or less densely brown pubescent. *Rachis* 3-5 in. long, with 2 conical glands on the petiolar portion and 1-3 smaller glands between the upper pinnæ. *Pinnæ* 6-11 pairs, up to 3.25 in. long, pubescent with 1 or 2 minute, flat glands between the upper pairs of leaflets. *Leaflets* 17-30 pairs, close and touching, .25-.3 by .08-.1 in., rather obliquely linear-oblong, tipped with a forward directed mucro; base truncate or subtruncate,

glabrous and dark green above, paler beneath, margins ciliate; midrib with spreading hairs. *Heads* about 50 flowered in terminal panicles or axillary, appearing bristly in bud on account of the linear acuminate hispid bracteoles; peduncles .4-.6 in. long, enlarging in fruit, bearing a small linear caducous bract at or above the middle, densely pubescent. *Bracts* linear-subulate, villous. *Calyx* about .08 in. long, glabrous. *Corolla* .1 in. long, glabrous. *Ovary* glabrous on a short glabrous stipe, about .2 in. long, the latter surrounded at the base by a cylindric disk. *Pod* 4-6 by .8-1.2 in., brown pubescent, usually with minute glands when young, sutures often undulate, rather prominent.

N. CACHAR HILLS, DARRANG, SIBSAGAR.

Flrs. 8. Fr. 2.

8. *Acacia concinna* DC. Vern. *Pasoi-tenga*, *Kusiakaint*, *Kachuai*, *Amsikira*, *Suse-lewa*, Ass.; *Sia-thli*, *Jarmiersa*, Kh.; *Sirengkhi*, *Suchei-wak-chigong*, Garo; *Serhuarikong*, Mik.

A straggling prickly shrub or a large climber; stem terete with 5 rows of conical and more or less hooked prickles; twigs lenticelled; young parts grey or ferruginous, tomentose. *Leaf rachis* 2.5-5.5 in. long, more or less downy, often prickly, ending in a subulate awn, with a prominent gland near the base and another below the uppermost pair of pinnæ; stipules about .3 in. long, hairy, obliquely ovate, acute, auricled at the base; pinnæ 3-6 pairs, middle ones 2.3-2 in. long. *Leaflets* from 5-6 pairs in the lower pinnæ to 10-14 pairs on the middle pinnæ, .4-.6 by .15 in., oblong; apex usually rounded, cuspidate; base obliquely truncate and midrib closer to the upper margin, membranous, pale-green and glabrescent above and glaucous beneath. *Flowers* brick red in bud, white after opening, on peduncled heads, which are .4-.5 in. across. *Peduncles* .6-2 in. long, downy, usually in fascicles of 2-4, from leaf axils or arranged in panicles at the ends of branches. *Bracts* deciduous, resembling the stipules. *Calyx* red, funnel-shaped, deeply lobed. *Corolla* slightly exserted; lobes white with red median lines. *Ovary* glabrous, except for a few hairs near the top. *Pod* thick and fleshy, 3-4 by

·7-1 in., often indented between the seeds, sometimes curved, stipitate, saponaceous, indehiscent.

DARRANG, SIBSAGAR, NOWGONG, KAMRUP, KHASI HILLS—up to about 2,500 ft., GARO HILLS, GOALPARA.

Flrs. 3-5. Fr. 12-1.

Var. *rugata* Ham. Ovary villose; leaflets and pods larger than in the type—the latter 1-1·2 in. broad.

SYLHET—Badarpur (My sheet 9,678) and probably also elsewhere in the province.

Acacia dealbata Link. Vern. *Tiw-babur*, Kh. The silver wattle.

A moderate sized unarmed evergreen tree with nearly smooth grey or dark-brown bark; twigs, leaf rachis and inflorescence hoary. *Leaves* 2-6 in. long, bipinnate; rachis often with glands between the pinnæ; pinnæ 10-20 pairs, about 1·75 in. long. *Leaflets* 30-40 pairs, crowded, linear, ·15-·2 in. long, glaucous, green and pubescent. *Flowers* yellow, fragrant in globular heads, which are about ·35 in. across. *Calyx* minute, campanulate. *Corolla* yellow, about twice as long as calyx, deeply 5 lobed. *Ovary* sessile, minute, hairy; style just exceeding the stamens. *Pod* 3-4 by ·3-·4 in., reddish-brown, little or not, constricted between the seeds.

A native of Australia, cultivated and sometimes naturalized at Shillong.

The bark is rich in tannin containing about 30-35 per cent of tannic acid.

Its growth is rapid and it reproduces itself profusely from root-suckers.

Flrs. 12-2, when it is very ornamental.

A few phyllodineous *Acacias* are sometimes met with in gardens at Shillong but the above is the only common Australian *Acacia* in the station.

6. ALBIZZIA Durazz.

Usually unarmed trees, rarely shrubs or climbers. *Leaves* bipinnate, usually with a gland near the base and sometimes between the upper pinnæ. *Flowers* in globose heads (Indian species) sessile or pedicellate, usually pentamerous. *Calyx* campanulate or tubular. *Corolla* funnel-shaped; petals united below the middle. *Stamens* indefinite; filaments several times the length of the corolla, united at the base or high up; anthers minute, not gland

crested. *Ovary* sessile or shortly stalked, many ovuled; style filiform; stigma capitate, minute. *Pod* thin, flat, strap-shaped, indehiscent or tardily dehiscent, continuous within. *Seeds* compressed, exalbuminous.

I. Erect trees; pulvinus not accrescent; pinnæ under 12 pairs; leaflets over .1 in. width :—

A. Pinnæ usually 1 pair, second pair if present much weaker; leaflets never more than 3 pairs, large (2-6 in. long), acuminate; midrib central or nearly so.

1. *A. lucida.*

B. Pinnæ 2-6 pairs; leaflets more than 3 pairs, moderate-sized (under 2.3 in. long), never acuminate; midrib not very close to upper edge :—

1. Flower heads in panicles; flowers sessile :—

Leaf-rachis 10-18 in. long; leaflets over .5 in. broad; midrib diagonal, close to the lower edge for greater length. ..

2. *A. procera.*

Leaf-rachis 4-8 in. long; leaflets under .5 in. broad, midrib parallel to upper edge and closer to it.

3. *A. odoratissima.*

2. Flower heads from upper leaf axils or in short corymbose racemes; flowers pedicellate :—

Leaflets 3-10 pairs; pods straw-coloured.

4. *A. Lebbek.*

Leaflets 12-22 pairs; pods brown.

5. *A. Kalkora.*

C. Pinnæ 6-12 pairs; leaflets small, falcate, oblong; midrib very close to upper edge :—

Stipules conspicuous; flower heads in panicles; stamens pale white. ..

6. *A. stipulata.*

Stipules minute; flower heads from upper leaf axils or in short simple racemes; stamens rose-coloured. ..

7. *A. Julibrissin.*

II. Climber or small straggling tree, pulvinus below leaf-base, enlarging into a firm short recurved hook; pinnæ over 12 pairs; leaflets very small, linear, under .05 in. wide; midrib of leaf central or nearly so. ..

8. *A. myriophylla.*

1. **Albizzia lucida** Benth. Vern. *Moj*, *Michhagach*, Ass.; *Sundi*, Sylh. and Cach.; *Champa shundi*, Sylh.; *Mijjiphang*, Cach.; *Missi*, *Luang-khoi*, Manipur; *Kamatek*, Lush.; *Miji*, Kach.; *Tage*, *Dumbre*, *Lang-git-asing*, Miri; *Dumkol-asing*, Abor.; *Uchupi-arong*, *Ing-hok-arong*, Mik.; *Bumrundu*, Mech.; *Macha-borga*, Garo; *Arda-thol*, *Erbulthing*, Tipp.; *Theng-cher-tam*, *Athi-ong-cha*, Kuki; *Dieng-pantalong*, *Dieng-sa-rynto*, *Dieng-kharu*, Budi, *Dieng-til-pot*, *Dieng-ri-i*, Kh.

A middle-sized nearly evergreen tree. *Bark* nearly smooth, with horizontal wrinkles, and warty with lenticels, green below the cuticle, brown or light red inside, .3-.6 in. thick; young shoots and inflorescence brown, silky. *Rachis* .6-2 in. long, with a large cup-shaped gland .2-1 in. from the base and sometimes another near the top. *Pinnæ* 1.2-5.5 in., usually 1 pair, rarely 2 pairs with a gland at the base of the uppermost pair of leaflets and sometimes below the next pairs. *Leaflets* 2, sometimes 3, rarely 1 pair (second pair of pinnæ when present eglandular with 1 pair of leaflets), generally 2-6 by 1-1.7 in., terminal pair usually largest, lowest sometimes only 1.2 by .6 in., oblong-lanceolate or oblanceolate, somewhat abruptly acuminate; base obliquely cuneate to rounded, glabrous, glossy dark-green above, pale beneath, thinly chartaceous; lateral nerves 7-9 on either half, arcuate; petiolule up to nearly .1 in. long. *Heads* small, peduncled; peduncles .5-1 in. long, slender, glabrate or puberulous with age, 1-4 together, corymbosely or subumbellately arranged on branches, 1.5-6 in. long, which are themselves subcorymbosely arranged on terminal leafy panicles, up to 10 in. long. *Bracts* and bracteoles minute. *Pedicels* up to .1 in. long. *Calyx* about .07 in. long, campanulate, puberulous in mature flowers; teeth short. *Corolla* about .2 in. long, silky outside; segments lanceolate. *Filaments* .5-.6 in. long, pale yellow; staminal tube slightly shorter than the corolla-tube. *Pod* 6-10 in. long, 1-1.25 in. wide, attenuated at both ends, deep brown, reticulated, opposite the seeds, shining elsewhere, thin, flexible at length, dehiscent. *Seeds* 6-8, orbicular.

Throughout the Province ascending to about 2500 ft. in the KHASI HILLS—Common in places in the plains, e.g., SYLHET.

The heart-wood is brown with dark streaks, hard, but it is scarcely used. Weight about 55 lbs. per c. ft. Lac is obtained from the tree. About 550-600 seeds weigh 1 oz.

Flrs. 3-5. Fr. cold season.

Leafless or nearly so for a short time during the hot season.

2. *Albizzia procera* Benth. Vern. *Jigring-bon-phang*, Cach.; *Tantari-asing*, Miri; *Sidak*, Abor.; *Korai*, Sylh.; Ass.; *Lau-khuri*, Mech.; *Khelvi*, *Khreuvi*, Garo; *Chachra-korai*, Jharua; *Warlong-arong*, Mik.; *Sai-noi-ramri*, Kuki; *Dieng-rilong*, *Dieng-soh-krait*, *Dieng-saw*, Kh.

A tall handsome subdeciduous tree, attaining (in Assam) over 80 ft. in height and 7 ft. in girth; bark nearly smooth, yellowish grey or brown outside, peeling off in thin irregular plates, .75 in. thick, green inside below the corky layers, red or pink with white streaks deeper down. *Leaf* rachis 10-18 in. long; basal gland large, oblong or oval. *Pinnæ* 2-6 pairs, 5-9 in. long, often with glands between the upper 1-2 pairs of leaflets; leaflets 6-16 pairs, 1-2.2 by .6-.9 in., oblique, oblong-ovate or rhomboid-oblong, obtuse, silvery when young beneath, both surfaces thinly adpressed pubescent or glabrescent with age, undersurface paler, thinly coriaceous; midrib diagonal, nearer the lower edge except at the apex; petiolules about .05 in. long. *Heads* .5 in. across, usually in fascicles of 2-5, sometimes solitary, arranged in large terminal panicles; bracts caducous; peduncles .5-1 in. long. *Flowers* sessile, yellowish white. *Calyx* about .1 in. long, tubular, glabrous outside; teeth unequal, triangular. *Corolla* up to .2 in. long; lobes oblong-lanceolate, pubescent outside. *Stamens* .4-.5 in. long; filaments yellowish; staminal tube about as long as corolla-tube. *Pods* 4-8 by .6-.9 in., glabrous, reddish-brown, flexible. *Seeds* 6-12.

Throughout the Province ascending to about 2500 ft. in the KHASI HILLS, sometimes grown as standard over tea—for which it is considered very suitable.

Heart-wood brown or with darker bands, resembling that of *A. Lebbek*, durable. The timber is even grained and seasons well. It is suitable for posts, agricultural implements, etc. It is occasionally used for tea boxes for which it should prove very suitable. Average air dry, weight for Assam about 50 lbs. per c. ft. About 500-850 seeds weigh 1 oz.

Growth is fast. Some of the younger branches of the tree are:

irregularly deciduous and have been observed to keep on dropping till the fourth year.

Flrs. rainy season. Fr. cold season.

3. *Albizzia odoratissima* Benth. Vern. *Hiharu*, *Goroi*, Ass.; *Cham-koroi*, (N. Kamrup); *Moroi*, Sylh.; *Turut-arong*, *Narlong*, Mikir; *Khelbi*, *Sisso*, Garo; *Siris-koroi*, Jharua, *Laukhri*, Mech.; *Moroi*, *Khoru*, Kach.; *Rumri*, *Mibang-hing*, Kuki; *Dieng-saw*, Kh.; *Dieng-krait*, Synt.; *Hejui-bang-ching*, Naga.

A large deciduous tree with spreading crown. *Bark* grey or brownish-grey to nearly black and rough outside, inside red with white streaks, soft, about .75 in. thick in old stems; young shoots and inflorescence densely pubescent. *Leaf-rachis* 4-8 in. long, with a large gland at the base, and 1.2 between the upper pinnæ, finely grey downy; stipules small, deciduous. *Pinnæ* 3-5 pairs, 3-6.5 in. long, puberulous or glabrescent. *Leaflets* 7-20 pairs, .6-1.25 by .2-.4 in., oblique, oblong-obtuse or sub-acute, often mucronate, sub-coriaceous, adpressed pubescent on both surfaces or glabrescent above, glaucous beneath; midrib parallel to and closer to the upper edge; base rounded or truncate, and 3-4 nerved on the outer and broader edge; petiolule very short. *Heads* few flowered, solitary or in fascicles of 2-5, on leafy corymbose panicles at the ends of branches; peduncles .5-1.5 in. long; bracts .1-.2 in. long, ovate, acute or acuminate, brown tomentose. *Flowers* sessile, fragrant. *Calyx* very small, campanulate, densely pubescent outside; teeth obsolete or minute. *Corolla* .15-.3 in. long, funnel-shaped, hairy; lobes lanceolate, about .1 in. long. *Stamens* pale-yellow, about .8 in. long; staminal tube about half the corolla-tube. *Pod* 5-12 by .7-1.2 in., shortly stipitate, thin, flexible, tomentose when young, reddish brown or dusky greenish brown, broadly but rather indistinctly reticulate. *Seeds* 8-12.

Plains of ASSAM from GOALPARA & SYLHET to DARRANG, probably in all Districts, ascending to 3000 ft. in the KHASI HILLS.

Sap-wood large, heart-wood dark-brown with darker almost black streaks, hard, durable, takes a fine polish and seasons well; could be used for the same purposes as that of *A. Lebbek*, which it resembles. Weight about 50 lbs. per c. ft. The bark cut into small pieces and

boiled with pounded leaves of *Sarcochlamys pulcherrima* gives a madder-brown dye.

Flrs. 5-6. Fr. cold season.

In some forms the heads are arranged subumbellately or corymbosely on the ends of panicle branches. Larger and more densely pubescent leaflets are usually correlated with this form; as there are intermediates connecting it with the type, it has not been separated.

4. Albizzia Lebbek Benth. The Siris tree. *Sirisha*, Sans. & Beng. *Kothia koroi*, Ass.; *Moroi*, Cach. & Sylh.; *Rumri*, Lushai; *Harish*, Sylh.; *Japhang*, Tipp.; *Dieng-sah-rin*, Kh.

A large deciduous tree with a spreading crown. *Bark* light grey to dark-brown or almost black, rough, irregularly cracked; outer half to third of blaze red or reddish-brown, inner portion yellowish or brown with paler strands. *Branches* lenticellate, lenticels sometimes coalescing to form lines; young shoots and inflorescence pubescent. *Rachis* 3-6 in. long, usually with a large oblong gland near the base and one or between the upper pinnæ; stipules small, linear, tomentose, caducous. *Pinnæ* usually 2-5 pairs, 2-8 in. long, often with glands between the leaflets; stipels at the base of the pinnæ, minute. *Leaflets* 3-10 pairs, 1-1.5 by .3-.8 in., obovate to oblong-narrower downwards, pale-green, glabrescent or adpressed pubescent beneath, obtuse or retuse at apex; base unequal, lower end broader half, 2-3 nerved; lateral nerves not prominent, meeting in loops near the margin, fewer on the broader half; petiolules very short. *Flowers* greenish-white, fragrant in pedunculate heads; peduncles 2-4 in. long, downy, solitary or in fascicles of 2-4 from upper leaf axils or at the ends of short leafless branches; bracts caducous, linear, tomentose; pedicel about .1 in. long, slender, pubescent. *Calyx* .15 in. long, pubescent, short toothed. *Corolla* .3 in. long, funnel-shaped, pubescent outside; segments lanceolate. *Stamens* 1-1.5 in. long, fading to yellowish with a green terminal portion. *Staminal tube* a little shorter than the corolla-tube. *Pod* 6-12 by 1.2-1.7 in., pale, straw-coloured, finely reticulate, alternately depressed on either side over the seeds, 4-12 seeded; sutures thickened.

All over the Province but not very common, ascending to about 2000 ft. in the KHASI HILLS, sometimes planted.

Sap-wood large white, heart-wood dark-brown with darker streaks. The timber is hard, seasons and polishes well and is fairly durable.

It is exported largely to America—probably along with the wood of other Albizzias under the name of East Indian Walnut for decorative furniture work. It is specially adopted for use in veneering and also for turnery. Average weight about 50 lbs. per c. ft. 140-350 seeds weigh 1 oz.

Flrs. 5-6. Fr. cold season; long persisting on the tree.

5. Albizzia Kalkora Prain in Journal of Asiatic Society, Bengal, Vol. LXVI, p. 511. *Mimosa Kalkora Roxb.*

A large tree with rough dark bark; branchlets lenticellate; young parts brown pubescent. *Leaf* rachis 4-8 in. long, at first downy, thin, glabrate, with a large elongated gland .25-.6 in. from the base and often one or more glands below the uppermost pair of pinnæ; stipules .15-.2 in. long, subulate, early deciduous, hairy. *Pinnæ* 3-8 pairs, rarely 2 pairs, 2.5-5 in. long, puberulous, usually with a gland between the uppermost pair of leaflets; lower pairs smaller. *Leaflets* 10-22 pairs, lowest pair often abortive, .5-.9 by .25-.3 in., obliquely oblong, obtuse or sub-acute, often minutely mucronate; base unequal, rigidly subcoriaceous, dark-green and glabrous or nearly so above (when mature), paler and puberulous or glabrescent beneath; midrib parallel to upper edge, lower half broader; lateral nerves 6-7 on the broader half, lower originating from the base; petiolule almost .05 in. long, puberulous. *Heads* 1-5 together from upper leaf axils, many flowered; peduncles 2.5-4 in. long, puberulous, the lower longer, making the inflorescence appear corymbose. *Flowers* deliciously scented, pedicellate, white; bracteoles up to .1 in. long, linear to linear-spathulate, hairy, caducous; pedicels .1-.2 in. long, minutely puberulous. *Calyx* .15-.25 in. long, funnel-shaped, puberulous; teeth unequal. *Corolla* .3-.4 in. long, greenish-white or yellowish-green; lobes lanceolate, .15-.2 in. long, silky on the backs. *Stamens* white, with green tips, 1.1-1.5 in. long; staminal-tube slightly shorter than the corolla-tube. *Pod* 6 by 1 in., strap-shaped, firm, dark-brown, 6-10 seeded, stalked, stalk .35 in. long.

KHASI HILLS, 3000-5000 ft., NAGA HILLS—Gierselere, Kohima, King's collector! nowhere common.

Closely allied to *Albizzia Lebbek* from which it can be at once distinguished by the large number of leaflets, and its dark-brown stipitate pods.

In journal of Royal Asiatic Society, Vol. LXVI, p. 512—says the leaflets are 1-1.5 in. long. The Chinese sheets in Herb. Calcutta, have leaflets of this size but in no Indian sheet in the collection there or in the Assam Herbarium they attain this size.

Flrs. 3-4.

6. *Albizzia stipulata* Boivin. Vern. *Saw-koroi*, *Sau*, Ass.; *Horish*, *Shirish*, Sylh.; *Arbhu*, *Ghoge siris*, Nep.; *Bolphu*, *Beolphiu*, *Borphi*, Garo; *Bhosra koroi*, Jharua; *Gurgeng-aring*, Miri; *Tat kung-asing*, Abor; *Dieng phyneat*, *Dieng-phallut*, Kh.; *Ching-ring-thing*, *Mabang*, Kuki; *Bongsip*, Lushai; *Luang-khoi*, Manipur; *Inghok-arong*, *Ti-ir-arong*, Mik.; *Bon-phru-phang*, Cach.

A large handsome fast growing flat crowned tree. *Bark* smooth, dark-brown or grey, horizontally wrinkled, lenticellate, outside dark-red or crimson, with white streaks inside, .6-1 in. thick and inflorescence tomentose. *Leaf* rachis 5-12 in. long with one large gland near the base and sometimes one or more between the pinnæ; stipules large, about 1 in. long, deciduous, obliquely semicordate, membranous, acute. *Pinnæ* 6-20 pairs, 2-6 in. long. *Leaflets* subsessile 20-40 pairs, .3-.5 in. by .1 in., falcate oblong, tapering to a sharp point; midrib close to the upper edge, glabrate above, pubescent beneath, downy along the margins. *Heads* pedunculate, in terminal and axillary paniced racemes; peduncles .7-1.2 in. long; bracts about .5 in. long, resembling the stipules, deciduous. *Flowers* sessile, yellowish-white. *Calyx* .1 in. long, tubular, funnel-shaped, tomentose outside; teeth short. *Corolla* .2-.25 in. long, pubescent outside; segments ovate-lanceolate. *Stamens* 1-1.3 in. long; staminal tube up to .17 in. long. *Pod* 4-6 by .5-.7 in., light-brown, thin, glabrous, tardily dehiscent; seeds 4-10.

Throughout the Province, often in old Jhums ascending to about 5000 ft. in KHASI HILLS.

The timber is lighter and less durable than that of *A. Lebbek*.

It is scarcely used but might prove suitable for tea boxes. About 900 seeds weigh 1 oz.

Flrs. 5-8. Fr. cold season.

Var. Smithiana Prain. (*Mimosa Smithiana* Roxb.). A tall tree with smooth greenish grey bark. *Stipules* small. *Stamens* with greenish tips.

7. *Albizzia Julibrissin* Durazz. Syn. *A. mollis* Boiv.

A medium-sized deciduous tree attaining about 50 ft. in height and 4-5 ft. girth, with broad crown. *Bark* rough, dark-brown or almost black, fissured, exfoliating in small irregular woody plates. *Blaze* pink with distant white streaks; young shoots, rachis, pinnæ and inflorescence covered with soft yellowish-brown pubescence. *Rachis* 4-10 in. long, pubescent with a large gland, .4-.8 in. from the base and sometimes with one or two more between the uppermost pairs of pinnæ. *Stipules* .2-.3 in. long, caducous, sub-falcately subulate, pubescent. *Pinnæ* (4-) 5-8, sometimes up to 12 pairs, 2.5-4 in. long; stipellæ minute, subulate. *Leaflets* 10-20 pairs, .4-.7 in. by .15-.25 in., subsessile, falcately oblong, acute; midrib close to upper edge; base inequal, broader half 2-3 nerved, truncate, dark-green above, paler beneath, adpressed pubescent on both surfaces. *Flower* fragrant, pubescent outside in peduncled heads which are solitary or in fascicles of 2-3 and arranged in short racemes at the ends of branches or the lowest from leaf axils. *Peduncles* 1.5-3 in. long; heads 20-28 flowered; bracts .15-.25 in. long, linear or subulate, caducous; pedicels very short. *Calyx* about .15 in. long, tubular teeth triangular. *Corolla* .2-.3 in. long, yellowish-green like the calyx; lobes .1-.15 in. long, oblong-lanceolate, acute. *Stamens* exserted, 1-1.4 in. long, upper $\frac{2}{3}$ rose pink and lower portion white or entirely white, filiform; staminal tube .15-.2 in. long. *Pod* 2.5-4 in. by .6 in., pubescent till mature, yellowish-brown. *Seeds* usually 2-6, but sometimes more.

KHASI HILLS 4000-6000 ft.

The specific name is a corruption of Hindustani Gulabi-resham—rosy silk which well describes the stamens.

Flrs. 4-5. Fr. 8.

8. *Albizzia myriophylla* Benth. Vern. *Themfra*, Cach.; *Thabphi-rikang*, Mik.; *Mei-theit*, Khasi; *Madhurang-lata*, Naga.

A large woody climber or a large shrub straggling on trees with raised dots on the branches; young parts brown, tomentose. *Rachis* 3·5-7·5 in. long, downy with soft brown hairs as are also the pinnæ, with a large cup-like gland near the base and several between the upper pinnæ; pinnæ 12-20 pairs, 1-2 in. long; stipules subulate, up to ·25 in. long; pulvinus below the leaf base, enlarging in to a recurved sometimes subspinescent almost woody hook. *Leaflets* 25-50 pairs, ·15·2 in. long, closely crowded, linear, often slightly falcate, subulate; base unequal, hairy along the margins when young, glabrate with age, dark-green above, pale beneath; midrib nearly central. *Heads* small, pedunculate, (peduncles solitary or 2-4 together, ·4·75 in. long, downy), arranged in terminal leafy panicles; bracts ·15·2 in. long, ovate, acute or acuminate, usually accompanied by subulate stipules like those of the leaves. *Flowers* sessile; calyx short, campanulate, brown, silky pubescent; teeth acute. *Corolla* ·1·15 in. long, pubescent outside; lobes lanceolate about one-third the tube. *Stamens* about ·4 in. long; filaments white or greenish; staminal tube about half as long as corolla-tube. *Pod* 4·6·5 in. by ·75-1 in., somewhat flexible, glossy-brown, dehiscent, 6-10 seeded, narrowed at both ends, shortly stipitate.

The fibrous bark is sweetish and of the taste of liquorice.

NOWGONG-Dhansiri Reserve, SIBSAGAR-Barapathar, KHASI & JAINTIA HILLS—Tharia-SYLHET-Hooker.

Albizzia Gamblei Prain in Journ. A. Soc. Beng., LXVI, p. 513.

A moderate-sized tree. *Rachis* 3-4 in. long with a large gland a little above the base. *Pinnæ* 2-3 pairs, 1-4 in. long, with large projecting glands between the last pair of leaflets. *Leaflets* 3-7 pairs, ·6-2 by ·4-1 in., decreasing in size downwards, ovate-lanceolate, acute or sub-acute; base cuneate from the middle, pale green above, glabrescent beneath, sparsely adpressed puberulous on both surfaces. *Heads* peduncled; peduncles about 1 in. long in fascicles, arranged in terminal and axillary panicles, minute. *Calyx* about ·1 in. long, campanulate, puberulous; teeth minute. *Corolla* ·2 in. long; teeth small, lanceolate; stamens ·3·4 in. long, staminal tube about as long as the corolla-tube. *Pod* 6-8 by 1-1·5 in., pale, straw-coloured. *Seeds* 6-8.

NAGA HILLS—Kohima, C. B. Clarke.

Parker suggests in Indian Forester, Vol. LVI (1930), p. 297 *et seq.*, that this plant is a hybrid between *A. Lebbek* and *A. lucida*. A plant has been raised from seeds collected from *A. lucida* tree in the Forest College grounds at Dehra, which is indistinguishable from *A. Gamblei*.

7. PITHECOLOBIUM Mart.

Shrub or trees generally with glands at the base of pinnæ and leaflets. *Unarmed* or with spinescent stipules or axillary spines. *Leaves* bipinnate, pinnæ paripinnate; stipules various; stipels 0. *Flowers* in globose heads or sometimes in subumbellate corymbs or spikes, usually hermaphrodite or pentamerous. *Calyx* campanulate or funnel-shaped with short teeth. *Corolla* funnel-shaped or tubular; petals united about half way up. *Stamens* monadelphous, indefinite, much exserted; anthers not gland tipped. *Ovary* sessile or stalked, many ovuled; style filiform; stigma minute capitate. *Pod* generally coriaceous, usually curved or twisted and dehiscent, suture not thickened. *Seeds* compressed, sometimes arillate.

- | | |
|---|--------------------------|
| I. Branchlets not prominently angled; pinnæ usually 1-2 pairs; leaflets few, 1-3 pairs. . . | 1. <i>P. bigeminum</i> . |
| II. Branchlets angled; pinnæ and leaflets each more than 4 pairs :— | |
| Terminal leaflets large, usually over 2 in. long; leaflets dissimilar. . . | 2. <i>P. angulatum</i> . |
| Leaflets all small, more or less similar, 1 in. and under. . . | 3. <i>P. montanum</i> . |

1. *Pithecolobium bigeminum* Benth. Ver. *Bhachahu*, Ass.; *Dieng-yap-yar*, Kh. and Synt.

A small to middle-sized tree; branchlet not angled. *Bark* nearly smooth, light grey or pale brown, more or less warty with lenticels; blaze red or brown, finely fibrous; young parts and inflorescence rusty pubescent; branchlets not prominently angled. *Leaf-rachis* 1-4 in. long, stout, with a raised gland below the lowest pair of pinnæ and usually one each at the base of each pair of pinnæ and leaflets. *Pinnæ* 1-2, rarely 2 pairs; 2-4.5 in. long. *Leaflets* 1-3 on the lower pinnæ, sometimes up to 4 pairs on the terminal pinnæ, 1.5-6 by .8-2 in., elliptic to oblong-lanceolate or oblanceolate, cuspidate, acuminate or acute; base not or slightly oblique,

sub-coriaceous, glabrous and shining above, paler or brownish and often puberulous along the nerves beneath; main lateral nerves 8-12 on either side, with few shorter intermediates between, arcuate, anastomosing near the margin; petiolules upto .15 in. long. *Flowers* white or pale creamy, sessile or shortly pedicellate upto about .25 in. long in 6-10 fld. pedunculate heads; peduncles .3-1 in. long in copious terminal or axillary panicles or in axillary racemes or sometimes fascicles, puberulous. *Calyx* small, brown pubescent; teeth acute. *Corolla* about double the calyx, .2-.25 in. long, including the calyx, pubescent outside, cleft deep down; stamens .4-.5 in. *Pod* 3-6 (sometimes upto 9) in. long by .6-1 in. broad, twisted once or twice into a spiral, downy when young, glabrescent with age, valves red inside.

KHASIA & JAINTIA HILLS upto 6000 ft. CACHAR HILLS-Prazer!

Wood light, reddish brown, pores scattered, often partitioned, med. rays very fine, often packed together in bends.

Flrs. 2-5. Fr. 1-2.

***P. glomeriflorum* Kurz.**

A shrub or a small tree; pinnæ one pair; branchlets not prominently angled; shoots pubescent. *Leaflets* 1-2 in. long, upto 3 pairs, elliptic-lanceolate, glabrous above, pale beneath; base slightly oblique. *Flowers* usually somewhat larger than in the last sp., .25-.5 in., upto the extremity of the stamens, in lax axillary and terminal rusty pubescent panicles.

I have not seen complete specimens of the species from our area. Most of the sheets referred to this species are *P. bigeminum*, or the materials are too incomplete for determination.

KHASI & JAINTIA HILLS.

Flrs. 3-4.

***Pithecolobium* sp. near *P. affine* Baker (sheet No. 3,662).**

A small tree, rachis stout, 2-2.5 in. long with a gland below the insertion of the pinnæ. *Pinnæ* 4-5.5 in. with a gland below the insertion of the upper leaflets. *Leaflets* 2 pairs, 5-9.5 by 2.5-5 in., elliptic to ovate-lanceolate, acuminate; base cuneate and thinly coriaceous, glabrous; lateral nerves 5-7 on either half; petiolules stout, upto .2 in. long. Flrs. & Fr. not seen.

LAKHIMPUR-Dulong Reserves.

2. ***Pithecolobium angulatum*** Benth. Vern. *Arda*, Tipp.; *Morog-mara*, Sylh.; *Sorkhi-biphang*, Mech.; *Thorekana*, Bhasahu, Ass.; *Ancharemchu*, Naga; *Theng-semai-arong*, Mik.; *Mongal*, Garo; *Pani-jigni*, Jharua; *Dieng-iap-iar*, *Dieng-khap-iar*, *Dieng-ia-lai-up-siar*, Synt.

A small to middle-sized tree. *Bark* dark-brown or grey, nearly smooth, with thin horizontal lenticular lines, red to reddish-brown inside; young shoots and inflorescence rusty pubescent; branchlets sharply angled. *Rachis* 2·5-8 in. long, angled, puberulous or glabrescent with a large gland near the base, sometimes with a smaller one immediately above, and usually with a small gland just below the insertion of the pinnæ; pinnæ 2-4 pairs, with a gland just below the insertion of each pair of leaflets; upper 3-7 in. long, lower smaller downwards, lowermost ·5-1·5 in. long. *Leaflets* 5-10 pairs in the upper pinnæ, 2-3 pairs in the lower pinnæ, diminishing in size and more oblique downwards, the terminal 3-6 in. by 1·25-2 in., lowermost ·6-1 by ·5·75 in., comparatively broader, oblong-lanceolate to elliptic or rhomboid-ovate, acuminate or acute, terminal usually with narrowed base; base of lower leaflets subtruncate or rounded, sub-coriaceous, puberulous along the midrib or glabrescent and dark-green above, pale and usually thinly pubescent or puberulous, specially along the nerves beneath; lateral nerves from 4 on either side in the lowermost to 14 in the uppermost leaflets, with several intermediates, meeting in loops near the margin; petiolules up to ·1 in. long. *Flowers* white or yellowish-white, ·2·25 in. long in peduncled umbellate corymbs; peduncles ·2·75 in. long, fascicled in the axils of gland bearing bracteoles on the branches of panicles; panicle branches usually fascicled; upper bracts with a large basal gland and a short simply pinnate foliar portion, lower gradually more leafy; panicles terminal and large, extending to the upper leaves; pedicels up to ·1 in. long, in the axils of minute bracteoles, slender, pubescent. *Calyx* ·05·07 in. long, campanulate, puberulous; teeth short acute; corolla about ·2 in. long, pubescent or puberulous outside. *Filaments* exserted, white or pinkish; staminal tube nearly as long as the corolla. *Ovary* puberulous, short stalked. *Pod* spirally twisted, 7-8 in. by ·7 in., distantly

sinuate between seeds on the lower margin; valves coriaceous, velvety when young, puberulous outside when mature, red and glabrous within. *Seeds* 8-10, purplish or bluish-black.

Almost all over the Province from DARRANG southwards ascending to 3000 ft. in KHASI HILLS.

The leaf is used with haritaki (*Terminalia Chebula*), fruits for dyeing cloth black.

Flrs. 3-5. Fr. 1.

3. *Pithecolobium montanum* Benth. Vern. *Tareppochangne*, Duff.; *Riang-arong*, Mik.; *Mathalai-baphang*, Cach.

A small tree. *Bark* dark-brown or grey somewhat rough with close horizontal, lenticular lines, red inside. *Branches* sharply angled; young parts rusty or brown pubescent. *Rachis* 6-8 in. long, pubescent; pinnæ 6-12 pairs, gradually smaller downwards, 1-4.5 in. long; leaflets close, from 5 pairs in the lowermost to 12 pairs or more, in the uppermost pinnæ, .5-1 by .25-.3 in., usually slightly broader and shorter downwards in each pinna, usually very oblique, rhomboid or tapeziform-oblong; margins often nearly parallel, acuminate; base more or less cuneate in the upper leaflets, in others the upper half truncate, lower half abruptly cuneate from or above the middle of the lamina, puberulous along the midrib or glabrate above, thinly pubescent beneath, subcoriaceous; midrib diagonal; main lateral nerves 5-10 on either side, looping near the margin; petiolule .05 in. with a circular gland below the insertion of each pair except the lowest. *Flowers* white, pedicellate in capitate peduncled umbels, which are arranged on the branches of an ample panicle; pedicels .1 in. long; calyx about as long as the pedicels. *Corolla* exserted; petals lanceolate, pubescent outside, about .12 in. long. *Pod* 4-5 in. long, twisted, glabrous.

KHASI HILLS, low elevations above SYLHET.

Flrs. 2-3.

8. CALLIANDRA Benth.

Shrubs or trees. *Leaves* bipinnate; leaflets few, large, glabrous, (Indian species); stipules usually persistent, often

spinescent. *Flowers* in globose heads, polygamous, 5-merous. *Calyx* campanulate; teeth short. *Corolla* funnel-shaped, 5 cleft. *Stamens* indefinite; filaments connate at the base, much exserted; anthers minute, not gland tipped. *Ovary* stipitate, many ovuled; style filiform; stigma minute, capitate. *Pod* strap-shaped, slightly falcate, flat, rigidly coriaceous; sutures much thickened; valves elastically dehiscent, being rolled backwards from top to bottom.

Common petiole 1·3 in. long; stipular spines strong and ultimately woody; glands at the insertion of pinnæ and terminal leaflets. ..

1. *C. umbrosa*.

Common petiole 2·5 in. long; stipular spines weak, never woody, no glands at the insertion of pinnæ and terminal leaflets. ..

2. *C. Griffithii*.

1. *Calliandra umbrosa* Benth. Vern. *Dieng-sia-soh-maria*, *Dieng-sia-soh-krot*, Kh.; *Utilou*, Manip.; *Patpui*, Lushai & Kuki; *Soambri-baphang*, Cach.; *Thing-seki*; Naga.

Usually a small, (sometimes middle-sized) tree; stem with brown-bark often with stipular spines; innovations puberulous; branches lenticellate. *Leaves* 2-pinnate; common petiole 1·3 in. long; stipules spinescent, considerably enlarging, and becoming woody with age and persisting after leaf fall; pinnæ one pair, 1·2-2·5 in. long, usually with a gland between them. *Leaflets* on each pinna, one pair terminal, 2·7-6 by 1·2-2·4 in. and usually a small odd leaflet, 1·3-2·3 by ·7-1·4 in. below on the outside, obliquely oblong-elliptic, lanceolate, bluntly acuminate or subacuminate, glabrous, rigidly subcoriaceous; main lateral nerves 5-10, arcuate; petiolule up to ·1 in. long with a gland between the terminal pair, and often one, on or below the petiolule of the odd leaflet. *Heads* peduncled, globose ·4 in. across, supported by a ring of minute bracteoles; peduncles ·4-1 in. long, usually clustered on old wood, rarely axillary. *Flowers* white or yellowish-white, sessile. *Corolla* ·12 in. long. *Pod* 6-10 by ·75-1 in.; valves finely reticulate with raised nerves; sutures elevated with rounded thickened edges. *Seeds* 4-9, ·5-·7 by ·35-4 in., broader than long, much compressed.

KHASI HILLS towards the foot on slopes facing SYLHET—Tharia, Pamati, Hatmawdan—locally common; SYLHET; CACHAR—Barak Reserve, Lower Jiri Reserve, Katakhal Reserve, etc.

The wood is said to burn badly with an offensive smell.

Flrs. rainy season. Fr. 2.

2. *Calliandra Griffithii* Benth.

A bushy shrub. *Rachis* short, .2-.5 in. long; stipular spines short and weak up to .2 in. long, sometimes obsolete. *Glands* absent at the insertion of pinnæ or leaflets. *Pinnæ* 1 pair, .3-.6 in. long, with a pair of large terminal leaflets, 1.7-3.2 by .5-1.5 in. and an odd smaller leaflet on the outer side .7-1.5 by .25-.6 in., obliquely narrow lanceolate to lanceolate, acuminate, glabrous, rigidly subcoriaceous; main lateral nerves 6-9 on either side. *Heads* axillary, supported by small linear lanceolate bracteoles on slender peduncles .75-2 in. long. *Flowers* sessile, about .35 in. long. *Calyx* .08 in. long. *Corolla* lobes lanceolate, about .1 in. long. *Pod* not seen.

KHASI HILLS 2000 ft., (Mann 426!) Mahadeo—3000 ft., (Kanjilal 4623).

Flrs. 9-10.

9. ENTEROLOBIUM Mart.

Enterolobium saman Prain. Syn. *Pithecolobium saman* Benth. The rain tree.

An evergreen middle-sized to large soft-wooded tree with a spreading crown. *Bark* dark-grey almost black in old trees; young shoots pubescent. *Leaf* rachis 4-6 in. long, often with a gland between each pair of pinnæ but none at the base, pubescent; stipules small, pubescent, deciduous; pinnæ 3-7 pairs, shorter downwards with glands between each pair of leaflets. *Leaflets* smaller downwards, 6-10 pairs in the upper, 2-3 pairs in the lowermost pinnæ; 1-2 by .5-1 in. obliquely rhomboid or ovate-oblong, obtuse, glabrous above, more or less pubescent beneath, specially along the nerves; midrib diagonal. *Flowers* 5-merous in dense rose-coloured heads on pubescent peduncles, 1-3 together from the upper axils and 2-3 in. long; pedicels slender, short, each with a small bract. *Calyx* pubescent outside, about .15 in.

long; teeth broadly triangular. *Corolla* pinkish, .3 in. long; tube puberulous outside; lobes half as long as the tube. *Stamens* connate below; filaments pink about 1.25 in. long. *Ovary* sessile, many ovuled; style filiform. *Pod* 5-9 in. by .6 in., indehiscent; sutures thickened; mesocarp pulpy; endocarp crustaceous and forming septa between the seeds.

A native of Guiana. Planted at Kulsi and often as a shade tree in the plains.

The pod is eaten by cattle. The pulpy mesocarp of the pods is sweetish. The tree is very fast growing and easy to propagate but is easily broken by winds.

Flrs. 2-6. Fr. 3-4.

FAM. 51. ROSACEÆ

Trees, shrubs or herbs. *Leaves* rarely opposite, simple or compound, stipulate; stipules sometimes adnate to the petiole. *Flowers* usually bisexual, regular, 5-merous. *Calyx tube* (hypanthium), free or adnate to the ovary. *Disk* lining the calyx tube or annular. *Stamens* perigynous, usually indefinite, rarely 5, 10 or 1 in one or many series; filaments free, rarely partially united, incurved in bud; anthers small, 2-lobed, opening longitudinally, introrse. *Carpels* free or connate; styles free or connate, basal, lateral or subterminal; ovules 1 or more in each carpel. *Fruit* various, sometimes formed partly from the calyx tube. *Seeds* erect or pendulous; albumen usually 0.

I. Calyx tube free or nearly so in flower:—

A. Calyx tube never completely enclosing the ripe carpels:—

1. Carpels solitary; fruit drupaceous:—

a. Petals conspicuous; drupes not transversely oblong:—

Style in fruit terminal; stone bony or nearly so.

1. *Prunus*.

- Style in fruit sub-basal; stone coriaceous. 2. **Prinsepia.**
- b. Petals inconspicuous; drupes transversely oblong. 3. **Pygeum.**
2. Carpels 5 or more :—
- a. Fruit of free drupes. 4. **Rubus.**
- b. Fruit of follicles :—
- Follicles 5 or more; testa membranous. 5. **Spiræa.**
- Follicle usually solitary nearly enclosed in the calyx tube; testa crustaceous. 6. **Neillia.**
- B. Calyx tube completely enclosing the ripe carpels; leaves imparipinnate; carpels free. 7. **Rosa.**
- II. Calyx tube adnate to the carpels :—
1. Ovary 5-celled; ovules 3 in each cell. .. 8. **Docynia.**
2. Ovary 2-5-celled; ovules 2 in each cell :—
- a. Fruit baccate; flowers in dense panicles. 9. **Eriobotrya.**
- b. Fruit fleshy but not baccate; inflorescence corymbose or in fascicles :—
- Fruit a pome; endocarp not extended nor dehiscent. 10. **Pyrus.**
- Fruit with a crustaceous, loculicidally dehiscent 5-celled endocarp. .. 11. **Stranvæsia.**
- Fruit with membranous endocarp; ovary 2-3 celled :—
- Leafy shoots entirely glabrous; leaves entire; styles nearly free; testa of seeds smooth. 12. **Photinia.**
- Leafy shoots woolly when young; leaves serrate; style united about half way down; testa of seed reticulately lacunate. 13. **Pourthiæa.**
- Fruit a drupe with 2-5 bony stones. 14. **Cotoneaster.**

1. PRUNUS Linn.

Shrubs or trees. *Leaves* alternate, simple, entire or toothed; petiole often 2-glandular towards the top. *Flowers* white or red, racemed, fascicled or solitary. *Calyx* free, completely deciduous or base of tube persistent; lobes 5, imbricate. *Petals* 5. *Stamens* many, 15-16, inserted at the mouth of the calyx tube; filaments free. *Carpel* 1; style terminal; ovules 2, collateral, pendulous. *Fruit* a drupe

with an indehiscent or 2 valved, smooth or rugged, 1 seeded stone. *Seed* pendulous.

I. Leaves serrate :—

A. Leaves closely serrate, deciduous :—

1. Flowers white in many flowered elongate racemes; petiole eglandular :—

Leaves usually glaucous beneath; lateral nerves 13-22; stone hard-shelled, about .6 in. long.

1. *P. nepalensis*.

Leaves green beneath; lateral nerves 8-13; stone thin-shelled, about .25 in. long.

2. *P. undulata*.

2. Flowers in subumbellate fascicles; peduncles short or 0; petiole glandular. Flowers pink, fading to white.

3. *P. cerasoides*.

B. Leaves distantly serrate; evergreen.

Petiole glandular; stone rugose.

4. *P. Jenkinsii*.

II. Leaves entire or nearly so :—

Leaves without black glands beneath; drupe .5-.6 in. long, ovoid with a more or less pointed tip.

5. *P. acuminata*.

Leaves conspicuously dotted beneath with black glands; drupe up to .3 in. across, globose.

6. *P. punctata*.

1. *Prunus nepalensis* Ser. Vern. Saiong, Khasi; Sohiong, Syntang.

A moderate sized to a fairly large deciduous tree attaining about 60 ft. in height and 4 ft. in girth. *Bark* grey or greyish white, somewhat rough with short vertical fissures and warts outside, greenish white inside, about .2 in. thick; branchlets purplish, shining, lenticellate. *Bud-scales* outer smaller, reddish-brown, ciliate, inner longer, membranous, yellow and brown. *Leaves* 3-6 by 1.2-2.5 in., lanceolate, oblong-lanceolate, caudate-acuminate, crenate-serrate; base rounded to acute, thinly subcoriaceous, glabrous above, glaucous beneath; lateral nerves 14-22 on either half; nervules very finely reticulated; petioles .7-1.2 in. long, channelled, glandular; stipules .25-.3 in. long, caducous, linear laciniate. *Flowers* white; racemes terminating leafy shoots or axillary, 2.5-5 in. long, bearing flowers down to the base, grey pubescent; bracts linear, about .1 in. long, early deciduous;

pedicels $\cdot 1\text{--}\cdot 15$ in. long, pubescent, enlarging to $\cdot 3\text{--}\cdot 4$ in. and closely lenticellate in fruit; buds ovoid. *Calyx* turbinate or hemispheric, grey pubescent, nearly $\cdot 1$ in. long; base of the calyx tube persistent and enlarging in fruit; teeth small, obtuse, subacute. *Corolla* $\cdot 1\text{--}\cdot 15$ in. long, broadly-obovate or orbicular. *Stamens* 20-30. *Ovary* glabrous. *Drupe* fleshy, $\cdot 7\text{--}\cdot 8$ in. long, black, globose, acid or subacid; stone smooth, about $\cdot 6$ in. long.

* KHASI HILLS 4-6000 ft; often cultivated for the fruits.

Flrs. 10-11. Fr. 7-8.

Prunus bracteopadus Koehne in Fedde's Report, spec. Nov. Vol. IX, 1910, p. 33.

Leaves 2-5 by $\cdot 5\text{--}\cdot 2\text{--}\cdot 2$ in. oblong or ovate lanceolate, sharply or caudate acuminate, minutely serrulate, lowest pair glandular; base rounded or acute, glabrous pale beneath; petioles usually $\cdot 3\text{--}\cdot 45$ in. long; stipules about $\cdot 2$ in. long, linear, glandular fimbriate. *Racemes* 3-5 in. long, bearing flowers to the base, terminating short leafy shoots, puberulous; bracts upto $\cdot 12$ in. long, membranous, with finely ciliate margins. *Calyx* tube about $\cdot 15\text{--}\cdot 2$ in. across, minutely puberulous or subglabrous, hairy at the base; sepals very short. *Petals* upto $\cdot 2$ in., obovate-oblong. *Stamens* 27-37. *Ovary* glabrous. *Drupe* not fleshy; stone $\cdot 6\text{--}\cdot 7$ in. long.

Jowai-King's collector! KHASI HILLS. Hk. f. & Thomson.

Flrs. 10.

Included under *P. nepalensis* in F. B. I. It differs mainly by the longer persisting bracts and more minute serrature of leaves.

2. **Prunus undulata** Ham. *Dieng-tyrkhum*, Khasi.

A small deciduous tree; young shoots puberulous; branchlets glabrous. *Leaves* 2-3-5 by $\cdot 6\text{--}1$ in., rather narrowly lanceolate or oblong-lanceolate, long acuminate, often undulate, crenate-serrate; teeth gland tipped, basal, often totally glandular; base rounded or acute, membranous, glabrous but hairy along the nerve axils and ultimately glabrescent beneath; lateral nerves 8-13 on either half; petiole $\cdot 2\text{--}\cdot 35$ in. long, eglandular. *Flowers* white. *Racemes* 2-5-5 in. long, puberulous, from axils of fallen leaves; pedicels slender, puberulous or glabrate, $\cdot 1\text{--}\cdot 2$ in. long. *Calyx* shorter than the pedicel, glabrous, more or less persisting in fruit; lobes obtuse, gland-toothed. *Petals* sub-orbicular, about $\cdot 08$ in. long. *Ovary* glabrous. *Stamens*

10-15, short. *Drupe* globose, pointed; stone thin-walled, smooth, about .25 in. long.

KHASI HILLS 3000-5000 ft.

Flrs. 4-5. Fr. 8-9(?).

3. *Prunus cerasoides* D. Don. Syn. *P. Puddum* Roxb. *Dieng-soh-iong-krem*, *Dieng-kadi-tusao*, Khasi; *Dieng-tyr-khung*, Synt.

A handsome middle sized deciduous tree. *Bark* more or less smooth, peeling off in horizontal dark-brown strips, exposing shining copper-coloured surface. *Blaze* yellowish, turning dark-brown. *Leaves* conduplicate in bud, 2-5 by 1-2 in., elliptic or ovate-lanceolate, caudate-acuminate; base rounded or acute, sharply singly or doubly serrate; serratures gland tipped, thin, dark-green and shining above, paler beneath, glabrous on both surfaces except for few tufts of hair on all or some of the nerve axils; lateral nerves 8-12 on either side; tertiaries subparallel; ultimate nervules very finely reticulated; petiole .4-.6 in. long, channelled, with usually a pair sometimes more of small reddish glands near the top; stipules linear, glandular-fimbriate. *Flowers* pink, fading to white, appearing before or with the leaves, in subumbellate, subcorymbose fascicles; peduncles 0 or very short; pedicels slender, .3-.6 in. long. *Calyx tube* narrow, campanulate, about .4 in. long, glabrous; base persistent in and supporting the fruit; lobes ovate, acute, .1-.15 in. long. *Petals* .3-.4 in. long, obovate; stamens many. *Ovary* glabrous. *Drupe* .5-.7 in. long, ellipsoid or oblong, yellow, sometimes tinged with red; stone bony, uneven and furrowed on the ventral face.

KHASI HILLS 4-6000 ft.

The wood is reddish-brown, close grained, polishes well. The branches make excellent walking sticks with the bark on.

Flrs. 10-12. Fr. 6.

Leaves shed towards the end of the rains. Very ornamental when in flower. The stone of our plant is *not* rugose as described by Hooker, Brandis, Parker, etc., but in other respects it does not differ from typical *P. cerasoides*.

4. *Prunus Jenkinsii* Hk. f. & Th. Vern. *Bon-thereju*, *Therejutenga*, Ass.; *Dieng-soh-setang-hi*, Synt.

An evergreen medium sized tree attaining about 60 ft. in height. *Bark* dark-grey or brown with lenticular warts outside, thin inside, light or reddish-brown, darkening on exposure. *Branchlets* glabrous, lenticellate. *Leaves* 4-7 by 1-2·3 in., narrowly lanceolate to oblong lanceolate, caudate-acuminate; base acute or cuneate, sharply but distantly serrate, glabrous, dark-green and glossy above, paler beneath; lateral nerves 9-15 on either half, arched; nervules finely reticulated; petiole 2·3 in. long, eglandular; stipules linear-lanceolate. *Racemes* 1·5-3 in. long, axillary, pubescent, strict, more or less erect, dense fld.; pedicels 25·35 in. long, pubescent. *Flowers* white. *Calyx* about 15 in. long, broadly turbinate, pubescent, specially towards the base; basal portion of calyx tube persistent; lobes obtuse, minutely toothed. *Petals* orbicular. *Stamens* 20-25, about 15 in. long. *Ovary* glabrous. *Drupe* acid, 8·9 in. long, ovoid, obovoid or subglobose; stone pointed or rounded at the apex, rugose, with a thick ridge on one side.

SIBSAGAR, LAKHIMPUR, KHASI HILLS—low elevations. Sometimes cultivated for the fruits.

Leaves turn yellow before falling.

Flrs. 10. Fr. 2.

5. *Prunus acuminata* Wall. Vern. *Dien-soh-iong-blei*, Khasi.

A moderate-sized or small tree. *Bark* grey or dark-brown to almost black and closely warted outside, inside reddish-brown or reddish, finely fibrous, often with a smell of bitter almonds, 2·3 in. thick. *Branchlets* thickly lenticellate, glabrous all over. *Leaves* 3·5·5 by 75-2 in., lanceolate, usually caudate, acuminate, tip often mucronate, subcoriaceous, entire,—undersurface paler and sometimes with obscure minute black glands; lateral nerves 6-8, arcuate; petiole 2·3 in. long, channelled, eglandular; stipules caducous, linear. *Flowers* white, scented, in axillary racemes. *Racemes* 1-3 together, 1·7-3·5 in. long; bracts minute, caducous; pedicels about 1·2 in. long. *Calyx* 12·15 in. long, cup-shaped, basal portion persisting in fruit; teeth

obscure. *Petals* about .1 in. long, broadly elliptic or suborbicular (oblong according to Hooker). *Stamens* about 15. *Ovary* villous; stigma capitate. *Drupe* .5-.6 in. long, ovoid, subacute tip, glabrous; stone thin, quite smooth.

KHASI HILLS 2350-5000 ft. GOALPARA-Mann (?) (if the label is correct).

Wood reddish-brown with pretty silver grain in radial section, takes a fine polish; pores small; medullary rays of two kinds very fine ones, alternating with fewer broad rays. According to Gamble used for planking and boxes in the Darjeeling District.

Flrs. 10-11. Fr. 6.

6. *Prunus punctata* Hk. f. & Th. *Dieng-ning-iong*, *Dieng-snoin-iong*, *Dieng-jar-maikoh*, *Dieng-soh-dkhiew-synrang*, *Dieng-soh-iong-trong*, Kh.

A small evergreen tree; bark dark grey or dark brown to almost black, thin, inside light red or brown turning darker brown on exposure; branchlets pubescent when young. *Leaves* 2.4-5 by .7-1.5 in., lanceolate or oblong-lanceolate, elliptic-oblong, caudate acuminate; tip obtuse, crowned by a hooked mucro; base cuneate to rounded, distantly serrulate, subcoriaceous, glabrous, shining above, dotted below with minute black glands; lateral nerves 8-10 on either half, meeting near the margin in loops; petiole .2-.3 in. long, eglandular; stipules caducous, linear or subulate, .3-.5 in. long with few distant weak gland-tipped teeth. *Racemes* slender, axillary, 1.2-2 in. long, glabrous, bearing up to 10 flowers, lower half to two-third of the racemes with no flowers; pedicels .15-.2 in. long; bracts subulate, .1-.15 in. long, caducous. *Flowers* white about .2 in. across. Calyx broadly turbinate; tube glabrous or silky hairy at the base and persisting in fruit; lobes rounded, erose and ciliate. *Petals* about .1 in. long, suborbicular; stamens about 20? (30 according to Brandis); ovary glabrous. *Drupe* .25-.3 in. across, globose, smelling strongly of bitter almonds; stone thin-shelled, smooth.

KHASI HILLS, 4000-5000 ft.

Flrs. 4. Fr. 9-10.

***Prunus persica* Benth et Hk. f. The Peach.**

A small to moderate sized deciduous tree. *Leaves* 2.5-4 in. long, narrowly lanceolate or oblong lanceolate, acuminate, sharply serrate,

glabrous and dark green above, pubescent beneath along midrib when young; petiole glandular or not; stipules subulate, fimbriate. *Flowers* pink, usually before sometimes with the leaves, mostly solitary from scaly buds on last years wood. *Drupe* downy, succulent; stone deeply and irregularly furrowed.

Cultivated mostly in the hills and also in the plains. A variety with double flowers is grown as an ornamental plant about Shillong.

Flrs. 1-2. Fr. 5-7.

Prunus communis Hudson. incl. *Prunus cerasifera* Ehr. Plum, Damson, etc.

A shrub or a moderate sized tree, sometimes spinescent. *Leaves* lanceolate or oblanceolate, acuminate, glabrous, serrate; petiole glandular; stipules linear fimbriate. *Flowers* white in fascicles from lateral buds. *Drupe* globose or oblong, smooth.

Cultivated in Shillong.

Flrs. 2. Fr. 6-7.

The copper plum *Prunus cerasifera* var. *Pissardi* has been introduced at Shillong where it is grown for its ornamental reddish purple foliage.

Prunus triflora Roxb.

A small tree. *Bark* smooth, blackish, glabrous. *Leaves* 2-3 by 1-1.5 in., obovate, oblanceolate, acuminate, crenulate; base acuminate, biglandular; petiole slender, .3-.6 in. long; stipules ciliate; lateral nerves 6-9 on either side. *Flowers* small, bisexual, regular, arising from the axils of fallen leaves in small fascicles; pedicels slender, about .5 in. long. *Calyx* glabrous; lobes longer than the tube, shortly clawed; filaments many. *Stigma* conspicuous; style long. *Fruit* a drupe, size of a cherry, pruinose, dark purple, cordate-ovoid (Kurz).

Cultivated, KHASI & JAINTIA HILLS.

Leafless in cold season. Flrs. 2. Fr. 5.

2. PRINSEPIA Royle.

Prinsepia utilis Royle. Vern. *Sohmonrit*, *Dieng-sia-soh-khar*, *Dieng-sla-soh-mon*, Kh.

A large straggling shrub attaining about 12 ft. in height; bark rough, exfoliating in papery scales, thin; blaze yellowish; branches several, green, armed with stout axillary often leaf bearing spines, up to 2.5 in. long; young parts puberulous. *Leaves* alternate, 1-3 by .3-1 in. oblong to ovate-lanceolate, acute or acuminate, minutely glandular, serrate, coriaceous, glabrous, dark green above, paler beneath; main lateral nerves 7-9 on either half, impressed

above; base narrowed, often abruptly, to a channelled petiole, up to .6 in. long; stipules caducous, linear, up to .2 in. long. *Flowers* yellowish-white or white, .3-.4 in. across in short axillary racemes; buds globose; racemes often in pairs, up to 2 in. long, puberulous; bracts minute, sharp-pointed; pedicels .3-.5 in. long. *Calyx* cup-shaped, persistent, puberulous, often with a tinge of purple outside; lobes 5, unequal imbricate in bud, up to .15 in. long, suborbicular, more or less erose. *Petals* imbricate in bud, suborbicular-obovate or orbicular, about .2 in. long, shortly clawed. *Stamens* many in several series of the mouth of the calyx tube; filaments short; anther cells separated by a broad connective. *Carpel* 1, free; style basal, short, thick; stigma expanded, depressed in the centre; ovules 2 pendulous. *Drupe* .5-.7 in. long, cylindric-oblong, deep-purple, almost black and pruinose when ripe; style scar sub-basal; endocarp coriaceous, smooth, 1 seeded.

KHASI & JAINTIA HILLS, over 4000 ft. In open slopes, often in village hedges.

Frs. 12. Fr. 3-4.

3. PYGEUM Gærtn.

Evergreen trees or shrubs. *Leaves* alternate, usually quite entire, often with two glands towards base of the blade. *Stipules* minute, fugacious. *Flowers* small, in racemes, sometimes unisexual by the ovary being sometimes absent. *Calyx* free, deciduous; limb 5-15 toothed, often unequal. *Petals* minute, 5-6, often tomentose and undistinguishable from the calyx lobes or absent. *Stamens* 10-50 in one or more series on the rim of the calyx tube; filaments slender, incurved; anthers small. *Carpel* 1, at the base of the calyx tube; style sub-terminal, slender, exserted; stigma capitate; ovules 2, collateral, pendulous. *Fruit* a transversely oblong-obscurely didymous, rarely subglobose drupe; pericarp thin, dry or juicy. *Seeds* usually 2; cotyledons very thick, hemispheric.

The leaves and fruit if crushed emit a strong smell of bitter almonds.

Leaves glabrous beneath; ovary glabrous or nearly so; drupe 1 in. or more across :—

- | | | | | | |
|--------------------|----|----|----|----|------------------------|
| Racemes pubescent. | .. | .. | .. | 1. | <i>P. acuminatum.</i> |
| Racemes glabrous. | .. | .. | .. | 2. | <i>P. glaberrimum.</i> |

Leaves clothed beneath with somewhat harsh brown hairs; ovary densely villous; drupe about .5 in. across.

- | | | | | |
|----|----|----|----|---------------------|
| .. | .. | .. | 3. | <i>P. montanum.</i> |
|----|----|----|----|---------------------|

1. *Pygeum acuminatum* Coleb. *Ril-deng-thing*, Kuki.

A moderate sized to large tree. *Bark* grey or dark-grey, slightly rough with light fissures and warts outside, thin; inside greenish-white or pinkish brown, darkening on exposure; blaze and fruit usually with a smell of bitter almonds; branchlets with raised lenticels; young parts pubescent but soon becoming glabrous. *Leaves* 3.5-7 by 1.5-3 in., oblong, ovate-lanceolate or elliptic, acuminate; base usually unequal, cuneate or acute, quite entire, basal glands 0; lateral nerves 6-8; tertiaries subparallel, both impressed above; petioles .3-.5 in., channelled, puberulous, ultimately glabrous. *Racemes* a little shorter than the leaves, slender, axillary, densely pubescent. *Flowers* small; pedicels about .15 in. long. *Calyx* 6 lobed, lobes narrowly lanceolate, basal portion of calyx tube persisting in fruit; petals 6, villous. *Stamens* about 30. *Ovary* glabrous but with a ring of persistent hairs at the base. *Drupe* about 1 in. across, transversely oblong, glabrous.

GOALPARA, Haltugaon, Guma Reserve; CHACHAR-Barak Reserve, apparently not common.

Fl. 5.

2. *Pygeum glaberrimum* Hk. f. *Bol-mangsam*, Garo; *Gandhi-gach*, Ass.; *Kadong-asing*, Miri, Abor; *Dieng-soh-kynti*, *Dieng-soh-khyrnem*, Kh.; *Raphir*, Lushai; *Ranphir*, Tippera; *Tia*, Nep.; *Bomphang-rakhet*, *Mukhra-Letei*, Mech; *Hanam*, Naga.

A large evergreen tree attaining 100 ft. in height and 8 ft. in girth. *Bark* usually grey, somewhat rough with fissures and lenticular warts outside, thin; blaze reddish-brown to brown with lighter streaks, darkening on exposure and smelling of bitter almonds; young parts puberulous; branchlets lenticellate. *Leaves* rather variable, oblong-ovate-

lanceolate to sometimes elliptic, caudate-acuminate; acumen long or short, entire; base cuneate or acute, usually without glands; lateral nerves 5-8 on either half, depressed; petiole .2-.5 in. long, channelled. *Racemes* slender, glabrous, 1-2 together from leaf axils, 1.5-4 in. long. *Pedicels* .15-.2 in. long, much elongated in fruit. *Calyx* up to .1 in. long, turbinate, glabrous; base of calyx tube silky pubescent and persistent in fruit; teeth obscure, villous. *Petals* about .1 in. long, oblong, hooded. *Stamens* 12-15. *Ovary* thinly hairy, soon glabrate; style exserted, long; stigma dilated. *Drupe* .6-.7 in. long by 1-1.2 in. across, transversely oblong, obscurely didymous; stone reticulately marked and with a short beak.

Throughout the province ascending to about 2000 ft. (to 5000 ft. according to Gamble) in the Hills; nowhere common.

The leaves and fruit smell of bitter almonds when bruised.

Flrs. 11. Fr. 2.

3. *Pygeum montanum* Hk. f. *Dieng-cha-lawan-synrang*, *Dieng-soh-iong-blei*, Kh.; *Dieng-satler-soh*, *Dieng-stain-sine*, Synt.

A small to medium sized tree. *Bark* light grey or brown to almost black and somewhat rough with warts outside, thin; blaze reddish or reddish-brown, turning darker on exposure, with characteristic smell of bitter almonds; young parts tomentose or pubescent; branchlets stout, lenticellate. *Leaves* 3-7 by 1.4-3.5 in., oblong to ovate-lanceolate or elliptic, sharply acuminate; base rounded or subcordate, often unequal and with two raised glands above with corresponding pits on the undersurface, coriaceous, glabrate above except along the midrib and often along the nerves when mature; margins ciliate with spreading hair at least when young, undersurface pubescent or tomentose specially on the nerves; nerves and nervules impressed above; main lateral nerves 9-12 on either side, arched; petioles .2-.5 in. long, rusty pubescent or tomentose; stipules up to .4 in. long, lanceolate. *Racemes* 1-2 in. long, solitary or in fascicles of 2-3 from axils of fallen leaves or from leaf axils, often branched from near the base, tomentose; pedicels up to .12 in. long; bracts minute, tomentose.

Flowers about .3 in. across when fully open, greenish-white or pale-yellowish, slightly scented. *Calyx* about .15 in. long, campanulate, tomentose outside; tomentum brownish or rusty with age, glabrous or nearly so within; base persistent; teeth 5, minute, woolly. *Petals* a little larger, white, woolly. *Stamens* 15-20; filaments white. *Ovary* densely silky-villous; style exserted, hairy towards the base. *Drupe* .3 in. long by .4-.6 in. wide, transversely oblong or obscurely didymous, usually with a very short beak, thinly pubescent.

LAKHIMPUR, DARRANG, KAMRUP, SIBSAGAR, KHASI HILLS—ascending to 5500 ft.; probably also in CACHAR and NOWGONG, not common.

Wood reddish-brown with unevenly distributed pores conspicuous on a longitudinal section, seasons well, but is not used in the Province except for fuel.

Flrs. 10-12. Fr. 2.

The following are very closely allied and are probably only varieties :—

1. *P. ciliatum* Koehne, in Engler's *Botanische Jahrbucher*, Vol. LI, p. 184.

Leaves 3-6 by 1.2-2.5 in., lanceolate, elliptic or ovate, lanceolate, shortly but sharply acuminate; margins ciliate, basal glands raised above, pitted beneath, glabrate above, undersurface pubescent or tomentose, specially on the nerves; lateral nerves 9-10; petioles .2-.3 in. long, thick. *Racemes* 1.5-2.3 in. long, sometimes slightly branched near the base in fascicles of 2-3 from nodes of last year's branches, rusty or brown tomentose. *Calyx-tube* broadly tomentose, about .1 in. across; lobes linear. *Stamens* about 50. *Drupe* .3-.4 in. across.

NAGA HILLS, Tangli Bam. Prain's Collector!

Flrs. 10. Fr. 12.

Differs from *P. montanum* mainly by its longer inflorescence, larger number of stamens and smaller fruits.

2. *P. ocellatum* Koehne in Engler's *Botanische Jahrbucher*, Vol. II, p. 184.

Current year's shoots glabrate with age. *Leaves* 2.4-3.6 in. by 1.2-1.4 in., margins ciliate; base subcordate or rounded, glands pitted on the undersurface, orbicular; lateral nerves 6-11 on either side, rest as in *P. ciliatum*.

KHASI HILLS about 5000 ft. *Hk. f. & Thomson*.

4. RUBUS Linn.

Erect sarmentose or scandent shrubs or sometimes creeping herbs, usually prickly. *Leaves* alternate, simple or compound; stipules free or adnate to the petiole. *Flowers* usually in terminal and axillary corymbose panicles less often solitary, white, pink or purple. *Calyx* persistent, deeply 5-cleft, with a broad tube. *Disk* lining the calyx tube. *Petals* 5; stamens many. *Carpels* many, sometimes few on a convex receptacle; style subterminal; ovules 2, collateral, pendulous. *Fruit* a collection of yellow, red, purple or black drupels, crowded upon a spongy or dry, cylindric or conical receptacle.

I. Leaves simple :—

A. Creeping undershrub, rooting often at the nodes :—

Leaves orbicular, reniform. .. 1. *R. calycinus*.

B. Sarmentose, straggling or climbing shrubs :—

1. Leaves lobulate or not lobed at all or with shallow lobes towards the base, longer than broad :—

a. Base of leaves cuneate, rounded or subcordate, never deeply cordate or hastate :—

i. Petals present :—

Mature leaves glabrous, caudate acuminate. .. 2. *R. acuminatus*.

Mature leaves pubescent beneath, never caudate acuminate. 3. *R. hexagynus*.

ii. Petals 0 :—

Mature leaves clothed with hoary tomentum. .. 4. *R. assamensis*.

b. Base deeply cordate or hastate :—

i. Leaves white or buff tomentose beneath :—

Leaves never hastate; petiole with weak prickles. .. 5. *R. paniculatus*.

- Leaves ovate cordate to hestate; petiole with strong recurved prickles. .. 6. *R. insignis*.
- ii. Leaves green beneath :—
 Leaves bristly pubescent on the nerves beneath; prickles on the petiole and midrib close. .. 7. *R. ferox*.
2. Leaves more or less deeply lobed, mostly as broad as or broader than long :—
 a. Eglanular :—
 Drupes scarlet. .. 8. *R. moluccanus*.
 b. Branchlets, petioles and nerves on the underside of leaves with gland tipped hairs. .. 9. *R. birmanicus*.
- II. Leaves imparipinnate; leaflets 3-5 :—
 A. Normally 3 leaflets :—
 Shoots with long reddish bristles; leaflets tomentose beneath. .. 10. *R. ellipticus*.
 Shoots without bristles; leaflets glabrous on both surfaces. .. 11. *R. lucens*.
 B. Normal leaflets 3-5 :—
 Branches covered with white waxy bloom, glabrous; glands 0; petals white. .. 12. *R. biflorus*.
 Branches pubescent; gland tipped hairs on calyx and often on new shoots. .. 13. *R. opulifolius*.
- III. Leaves imparipinnate; leaflets 5-11 :—
 Petals pink; drupes black :—
 Stem often with waxy bloom, eglandular. .. 14. *R. lasiocarpus*.
 Petals white; drupes red or orange :—
 Stem with (or without form II) gland tipped stiff hairs. .. 15. *R. rosæfolius*.

1. *Rubus calycinus* Wall.

A creeping perennial herb with wiry stems often rooting at the nodes and slender runners. *Branches*, petioles and undersurface of leaves along the nerves hirsute and with

slender, often recurved prickles. *Leaves* 1-2·5 in. across, orbicular-reniform, obscurely 3-5 lobed, coarsely toothed; upper surface thinly hirsute; base deeply cordate, usually 3-nerved; basal nerves 2 branched from near the origin, subcoriaceous; petiole ·7-2·5 in. long; stipules ·25-·5 in., broadly ovate, upper narrower, toothed or nearly entire, membranous. *Flowers* 1 in. across, solitary or twin from leaf axils on short 1-2 leaved shoots; bracts paired, similar to the stipules. *Calyx* hairy and densely covered with straight prickles, about ·1 in. long; lobes foliaceous, coarsely toothed, ·3 in. by ·2-·25 in. *Petals* shorter than the calyx lobes. *Fruit* globose about ·5 in. across, of a few scarlet drupelets, with long persistent styles; stones rugose.

KHASI HILLS 4500-5500 ft., Cherrapunji, Sohrarim, etc.

Fr. 6.

2. *Rubus acuminatus* Sm. *Syr-sym-khlim*, Kh.

A climbing shrub with switchy arching glabrous branches; prickles small, curved, often scattered, mostly on stems, few on the petioles. *Leaves* 3-6·5 by ·8-3 in., ovate or ovate-oblong or lanceolate, caudate-acuminate, doubly serrate, sometimes undulate, chartaceous; base rounded or cuneate, clothed with a few hairs when young, but soon becoming entirely glabrous, undersurface paler green; lateral nerves 7-10 on either half, lowest from near the base; midrib sometimes prickly; nervules very finely reticulated; petiole slender, ·3-·7 in. long; stipules ·15-·2 in. long, slender, subulate, early deciduous. *Flowers* white, 2-5 together, corymbose, usually on short peduncles arranged in leafy terminal panicles, up to about a foot long or from upper axils; peduncles up to ·4 in. long; bracts subulate, about ·1 in. long; pedicels ·3-·7 in. long; calyx ·3-·4 in. long, often rugose outside; segments ·25-·3 in. long, lanceolate, with hooked or recurved often dorsal tips, adpressed pubescent within, erect in fruit. *Petals* ·2-·25 in. long, elliptic-oblong. *Stamens* numerous. *Carpels* glabrous or thinly pubescent; receptacle villous with long erect hairs. *Fruit* scarlet, of large drupels; stone rugose.

KHASI HILLS, 4500-6000 ft.

Flrs. 8-9. Fr. 10-11.

3. *Rubus hexagynus* Roxb. *Soima-joth-let*, Mech.; *Thik-chambak*, *Nachhu-agam*, Garo; *Asari-kanta*, Nep.; *Naga-jejeru*, Ass.; *Sebi-mepung*, Duff.; *Si-um*, Kh.; *Mahui*, Lush.

A spreading woody climber; branchlets tomentose or pubescent with numerous prickles, flattened at the base; young parts villous. *Leaves* 3-4·5 by 1·2-2·2 in., oblong, oblong-lanceolate to ovate-lanceolate, acute, shortly acuminate or obtuse, closely serrate; base subcordate or rounded, coriaceous, glabrous with age above, except along the midrib and sometimes along the nerves, pubescent beneath, specially along the nerves; midrib usually with a few weak prickles; lateral nerves 7-11 on either half, arched, ending in serratures, prominent beneath; nervules finely reticulated; petiole ·2-·3 in. long, tomentose; stipules pectinate, about ·4 in. long including the terminal segments, pubescent or puberulous; segment about ·2 in. long. *Flowers* white in ample tomentose terminal panicles, the lower branches from leaf axils; pedicels ·15-·25 in. long, grey, pubescent; bracts ·15-·2 in., pectinate; segments up to ·1 in. *Calyx* grey pubescent, about ·25 in. long. *Calyx-tube* glabrous within; lobes about ·15 in. long, lanceolate or ovate acute; tip sometimes minutely 2-3 cleft, villous within, but glabrous along an ovate patch towards the base; petals linear oblong, shorter than the calyx lobes. *Stamens* numerous. *Carpels* glabrous, about 6 on a short, hairy receptacle. *Ripe drupels* ·25-·3 in. long, red, ultimately black when ripe; stone ·2 in. long, reticulately pitted.

KHASI HILLS, up to 4500 ft., LAKHIMPUR, DARRANG, SIBSAGAR, GARO HILLS, CACHAR, GOALPARA, SYLHET.

Flrs. 10. Fr. 11-1.

***Rubus Hamiltoni* Hk. f. Syn. *R. pyrifolius* Ham.**

A very similar climber to *R. hexagynus* and probably only a variety. *Branchlets* glabrate. *Leaves* 3-6 by 1·2-1·7 in., lanceolate or oblong-lanceolate, acuminate, (usually longer than in the last species), closely serrate, coriaceous; base rounded or subcordate; midrib prickly; lateral nerves 7-10; pedicels ·2-·3 in. long, pubescent; stipules as in the last species. *Panicles* not densely pubescent; pedicels slender, ·2-·25 in. long, pubescent; bracts up to about ·4 in. long, pectinate, longer than the buds; segments setaceous, up to ·3 in. long. *Calyx* about ·3 in. long, adpressed-pubescent outside, glabrous within; lobes lanceolate, cuspidate-acuminate; tip cleft into minute setaceous segments,

villous within except for an ovate patch at the bottom. *Petals* white, shorter than the calyx lobes. *Stamens* many; carpels 6 on a hairy receptacle. *Fruit* as in the last species.

SIBSAGAR and probably in other Districts.

This plant usually dries brown whereas *R. hexagynus* dries grey but this character can hardly be used for separating the two, as I have undoubted specimens of *R. hexagynus*, which have dried brown. The other characters by which it differs are its less tomentose branches and inflorescence narrower and longer acuminate leaves, much larger bracts with much finer and longer segments and the setaceous segments of the apex of the calyx lobes.

4. *Rubus assamensis* Focke. *Soh-chiria, Soh-nybat, Kh.; Jermai-che, Shi-larnai, Synt.*

Large spreading subsucculent shrub; branchlets, inflorescence and petioles villous with spreading hairs. *Prickles* recurved, small. *Leaves* 2-4 by 1-2 in. oblong or ovate-oblong, often obscurely lobed, shortly acuminate, unequally toothed, glabrescent above with age except along the nerves, undersurface felted with white wool, except along the nerves, which are clothed with spreading hairs; lateral nerves 5-6 on either half, very oblique, excurrent into teeth; base cuneate to rounded or subcordate; petiole .15-.25 in. long; stipules .4-.5 in. long, pectinately pinnatifid, hairy. *Flowers* white .2 in. long in ample conical terminal panicles, lower branches of which arise in leaf axils; pedicels about .25-.3 in. long, slender. *Bracts* about .2 in. long, subulate from half way down cut into small setaceous segments; bracteoles small, subulate. *Calyx* densely felted with silvery white wool and spreading hairs outside; segments ovate-acuminate, glabrous within except at the apex and along the margins. *Petals* 0. *Carpels* 10-22, glabrous or with few long hairs; styles long. *Fruit* hardly exceeding the calyx, globose; drupes few, large; stone pitted; receptacle villous.

KHASI HILLS 5-6000 ft.

Flrs. 5-6. Fr. rainy season.

5. *Rubus paniculatus* Smith.

A large rambling shrub often with dark purplish-brown stems; twigs, petioles, undersurface of leaves and inflorescence white or buff tomentose; prickles few, small, hooked;

glands and bristles absent. *Leaves* 3-6 by 2·5-3·5 in., broad-ovate, cordate, acuminate, often obscurely lobed, irregularly serrate, upper surface clothed with deciduous tomentum when young; base 3-5 nerved; petiole 1-2 in. long; stipules small, laciniate. *Flowers* white, ·7-1 in. across in much branched lax terminal panicles, 4-12 in. long, the lower branches from upper leaf axils; bracts small; pedicels ·2-1 in. long. *Calyx lobes* ·3-·4 in. long, ovate-lanceolate, often caudate-acuminate, erect or reflexed in fruit. *Petals* ·2-·3 in. long, shorter than the calyx lobes. *Carpels* glabrous. *Fruit* ·5-·7 in. long, exposed; drupes black, large, glabrous, succulent; receptacle villous; stone rugose.

KHASI HILLS, 4-5000 ft. *Hooker*.

I have not come across any specimens from our area.

Flrs. 4-6. Fr. 6-7.

6. *Rubus insignis* Hk. f. *Bor-sereli-kanit*, Ass.

A large rambling scandent shrub, clothed with the exception of the upper surface of leaves with buff cottony tomentum and also with spreading hairs; glands and bristles absent; prickles hooked, small. *Leaves* 4-9 by 3·5-5 in., ovate-cordate to hastate, lobulate, shortly and often rather abruptly acuminate, closely toothed, thin but tough, glabrate with age above; base 3-5 nerved; midrib prickly; the lateral nerves (above the basal pair) 8-12 on either half, sometimes with a few prickles; petioles 1-2 in. long, densely prickly. *Flowers* white, ·5 in. across in lax terminal panicles, armed with minute prickles, lower branches arising from upper leaf axil; pedicels up to ·4 in. long, very short in forms with crowded flowers; bracts about ·15 in. long, linear, often shortly 3-fid at the apex. *Calyx* densely buff-tomentose; lobes ·2-·3 in. long, oblong-lanceolate or lanceolate, pubescent within, apex sometimes minutely 2-3-fid into setaceous segments. *Petals* white, obovate, equalling or shorter than the calyx lobes. *Carpels* numerous, glabrous. *Fruit* black; drupes acid; receptacle villous.

DARRANG, Charduar Reserve (Belsiri); KHASI HILLS, probably in other Districts also.

Superficially similar in many respects to *R. paniculatus*, but more robust in all its parts except the flowers.

Flowers according to elevation 1-4. Fr. 5-6?

7. *Rubus ferox* Wall Cat. 724.

A spreading climbing shrub; twigs tomentose; prickles short, hooked, glandular hairs absent. *Leaves* 3-5 by 2-4 in., upper ovate; lower more orbicular in outline, acuminate, often shortly 7 lobed, acute or subobtuse, sharply toothed, thin; base cordate, harsh pubescent along the midrib and often along the nerves above, undersurface green, (not buff or white) with bristly hairs along the nerves; midrib usually prickly, sometimes with weak prickles on the other nerves; basal nerves ordinarily 5; lateral nerves 4-7 above the basal; petiole 1-2·3 in. long with numerous prickles; stipules pectinately pinnatifid as are also the bracts. *Flowers* about ·7 in. across, white in lax panicles with slender ramifications. *Calyx* tomentose outside; lobes ovate or deltoid, often with lacinate segments on the margins, erect in fruit. *Petals* as long as the calyx lobes. *Filaments* hairy. *Carpels* many; drupes many; stones rugose.

N. E. FRONTIER—near Sadiya, KHASI HILLS, Sohra—*Clarke*, Musmai,—*Clarke*.

Flrs. 8-11.

8. *Rubus moluccanus* Linn. Vern. *Jutulipoka*, Ass. (Sibsagar); *Thekhi-sambak*, Garo; *Pingta-Taru*, Duff.; *Inshun-aring-kang-arong*, Mech.; *Sumahar-arikang*, Mik.; *Setai-selu*, Nep.; *Kukur-khata*, *Shumu-kam-khaseba*, Kach.; *Artheimu-chinjat*, Kuki; *Soh-nybbah*, Kh.; *Sa-shei*, Synt.

A straggling or subscandent shrub; stems from about 4 ft. to 20 ft., in robust forms; eglandular; young shoots at first whitish or fulvous, silky villous, later on tomentose, often mixed with longer hairs. *Prickles* hooked and short or in some forms straight and strong attaining ·25 in., scattered over the branches, petiole, midrib and sometimes on the nerves. *Leaves* very variable in size, pubescence and texture 2-8 in. long, as broad as or slightly longer than broad, broadly ovate or rotundate in outline, 3-7 lobed; lobes rounded to acute or acuminate, inequally serrate-dentate; base cordate or retuse, usually 5-nerved, rugose between the nervules, scabrid or nearly smooth and thinly pubescent, sometimes hirsute or glabrate above, undersurface buff or

greyish tomentose and with spreading hairs on the nerves or hairy along the nerves only; lateral nerves 3-5 above the basal; petiole .6-4 in. long, buff or greyish tomentose, hirsute or pubescent; stipules very variable, leafy and ovate-lanceolate or oblong with incised margins or pinnatifid to laciniate, .3-1 in. long, pubescent or tomentose. *Flowers* white, .5-1 in. across, in short few flowered axillary racemes or in contracted terminal panicles. *Inflorescence* villous with silky buff, rarely grey tomentum or sometimes hirsute. *Pedicels* .3-.5 in. long; bracts from .2-1 in. long, resembling the stipules or elliptic to orbicular and sometimes almost entire. *Calyx* densely fulvous or grey silky also with short tomentum; lobes .3-.6 in. long, ovate to lanceolate, acuminate, entire or cleft at the apex or with few teeth or setaceous incisions on the upper half, adpressed pubescent within, erect or ultimately more or less spreading in fruit. *Petals* shorter than the calyx lobes, white, obovate. *Stamens* numerous, glabrous. *Carpels* many, glabrous. *Fruit* globose, .4-.6 in. across, in some forms longer than the calyx. *Drupe*s scarlet, succulent; stone rugose with fine dorsal subparallel, ridges and minute pitted reticulations, receptacle villous.

Practically all over ASSAM, ascending to 6500 ft. in the KHASI HILLS.

The fruit is eaten and the juice of the roots is used as a medicine for fistula.

Flrs. & Fr. according to elevation from 1-12.

The high level subsacendent forms flower and fruit from April to October.

I am unable to find any constant characters by means of which the robust forms of this species could be separated from *R. reticulatus* Wall Cat.

The various forms of this very variable plant are almost impossible to separate as they merge into one another. The forms found in our area may be tentatively grouped as follows:—

Form I. Leaves small to medium sized, longer than or as long as broad; lobes subacute rounded or obtuse; petiole with strong or weak prickles. *Flowers* small to medium sized. *Sepals* and bracts cut up at the tip or almost entire, .2-.4 in. long. Fr. small. Weak straggling shrub up to about 4 ft.

Form II. Low spreading shrub; stem sometimes rooting at nodes; branchlets hirsute. *Prickles* straight or slightly hooked, strong, sharp. *Leaves* medium sized to large, thinly hirsute above; nerves on the

undersurface clothed with rather stiff hairs, space between the nervules glabrous or tomentose; teeth very fine, crowned with tufts of hairs; lobes acute. *Petiole* with strong, nearly straight prickles; stipules .5-.8 in. long, usually laciniate; segments plumose with spreading hairs. *Flowers* .5-.6 in. across; bracts laciniate or pectinate at the apex. *Calyx* lobes usually with few green setaceous segments at the apex. A noticeable form. In shady situations often near water.

Flrs. & Fr. 6-9.

Form III. Straggling shrub, often very robust; stem attaining about 25 ft., in favourable situations. *Prickles* on stem short. *Leaves* as broad as long or longer, mostly large, rugose to nearly smooth above; lobes acute or acuminate, coriaceous to thin; petioles with few or many prickles; stipules foliaceous, variously incised. *Flowers* medium sized to large; bracts orbicular or elliptic to ovate in outline, usually incised, sometimes entire. *Fruit* often large.

KHASI HILLS 5000-6500 ft.

Flrs. & Fr. 5-10.

9. *Rubus birmanicus* Hk. f.

A straggling shrub with wiry stems; branches, petioles, nerves on the underside of leaves and stipules clothed with numerous, flexuous bristly hairs; prickles scattered, hooked with flattened base or straight. *Leaves* usually 5, sometimes 7 lobed; lobes acute, acuminate or subacute; teeth unequal, sharp, membranous; base deeply cordate, 5 nerved, thinly hairy or glabrate above, buff or pale brownish tomentose beneath; petiole 1.5-2.5 in.; stipules .6 by .4-.5 in. long, cut up into many capillary segments. *Flowers* large in panicles with short branches; bracts similar to the stipules. *Calyx* tomentose (but not hairy). *Calyx lobes* subacute. *Petals* white, equalling the calyx lobes, orbicular, clawed. *Stamens* very numerous. *Carpels* many, glabrous; receptacle villous.

KHASI HILLS 5-6500 ft., also GARO HILLS, sheet No. 5336 if the identification of this sheet which is incomplete is correct. The description of floral parts has been based on F. B. I.

10. *Rubus ellipticus* Smith. Vern. *Jotelu-poka*, Ass.; *Shumu-mukram*, Kach.; *Arthei-mu*, Kuki; *Sia-soh-pru*, Khasi; *Sohchi-u-sow*, Sashi, Synt.

A large straggling shrub, with flexuous branches; branchlets angled, shaggy with long reddish bristles often also with

a few glandular hairs; prickles stout, hooked or slightly curved at the tip. *Leaves* pinnately 3-foliolate, lower ones sometimes 1-foliolate; rachis 1-3 in. long, prickly on the underside also shaggy with bristles; stipules .2-.25 in. long, subulate. *Leaflets* 1.2-4 in. long, and as broad or nearly so, terminal largest, broadly obovate, elliptic or orbicular; apex retuse or abruptly acute, closely serrate, dark-green and glabrate above, pale and usually tomentose beneath; lateral nerves 7-9 on either half; petiolules of lateral leaflets very short. *Flowers* .3-.6 in. across, white, crowded in short terminal leafy panicles and also in short racemes from upper leaf axils; pedicels .15-.3 in. long, grey tomentose; bracts small, subulate. *Calyx segments* .2-.25 in. long, ovate or elliptic-oblong, mucronate or acute, tomentose or pubescent on both surfaces. *Petals* white, obovate, exceeding the calyx-segments. *Stamens* in one series. *Carpels* silky. *Fruit* .4-.6 in. across, orange-yellow; drupes succulent, crowded, receptacle tapering upwards, villous; stone rugose.

SIBSAGAR—*Kuji-bali*, GARO HILLS, N. CACHAR HILLS, KHASI HILLS—up to 6500 ft., sometimes gregarious in openings, usually in hilly country from 2000 ft. upwards.

The fruit has an excellent flavour and is much eaten wherever found.

Flrs. 2-3. Fr. 5-6.

11. *Rubus lucens* Focke. Vern. *Jejeru-poka*, *Noga-jhejhelu*, Ass.; *Sum-hal*, Mik.

A stout scandent shrub, climbing tall trees; young parts puberulous, soon becoming glabrous; branches angled, grooved. *Prickles* small, hooked, scattered. *Leaves* pinnately 3-foliolate; rachis 1.7-4 in. long, usually prickly, glabrous or nearly so with age; common petiole 1.5-2.5 in. long; stipules linear. *Leaflets* 2.5-5.5 by 1.3-3 in., elliptic, ovate-elliptic to ovate-lanceolate, shortly caudate-acuminate, sharply and somewhat distantly serrate; base rounded to acute, coriaceous, glabrous, shining above, paler beneath; lateral nerves 8-10 on either half; tertiaries subparallel, ultimate reticulations extremely fine; petiolules of lateral leaflets .1-.15 in. long. *Flowers* .3 in. across on short pubescent corymbose racemes or sometimes in clusters, arranged on the

branches of lax terminal panicles, the lower branches arising in leaf axils; pedicels $\cdot 2\text{--}3$ in. long, thinly pubescent; bracts about $\cdot 1$ in. long, subulate or linear spatulate. *Calyx* very deeply lobed; base of calyx tube sometimes rugose with age; segments $\cdot 15\text{--}2$ in. long, oblong, acute or obtuse, usually mucronate, erect in fruit, densely hoary tomentose, except towards the base outside, adpressed silky pubescent within. *Petals* nearly equalling the calyx segments, "white or pink"—*Hooker*, obovate, clawed. *Stamens* 20-30. *Carpels* few, hirsute. *Fruit* enclosed in the calyx; drupes varying from six to eighteen, juicy, red; stone rugose; receptacle pubescent.

KHASI HILLS and also N. ASSAM.

Fl. & Fr. 10-2.

12. *Rubus biflorus* Buch-Ham.

A large straggling shrub, often gregarious in openings; branches purplish, glabrous, covered with a white waxy bloom giving the plant a "white washed appearance." *Prickles* stout, up to $\cdot 3$ in. long with a broad compressed base, straight on the branches, hooked on young shoots and leaf rachis. *Leaves* (1)-3-5 foliolate. *Rachis* prickly, glabrous or pubescent, sometimes also with very short glandular hairs, $\cdot 7\text{--}3\cdot 5$ in. long; stipules about $\cdot 2$ in. long, subulate or linear, the terminal leaflet largest, 1-3 by $\cdot 8\text{--}2$ in., ovate to lanceolate or rhomboid in outline, mostly lobed, sometimes with subcordate base; the lateral leaflets $\cdot 8\text{--}2\cdot 5$ by $\cdot 4\text{--}1$ in., sessile, lanceolate to ovate, all inciso-serrate, thinly pubescent or glabrate above, white woolly tomentose beneath; midrib often with few weak prickles. *Flowers* white, $\cdot 5\text{--}1$ in. across, drooping, solitary and axillary or in umbellate cymes at the ends of lateral branches or from leaf axils; pedicels glabrous, pruinose, $\cdot 4\text{--}1$ in. long, slender. *Calyx* divided deeply; lobes about $\cdot 2\text{--}3$ in. long, ovate lanceolate, apiculate, erect or spreading, ultimately reflexed in fruit, pruinose, glabrous or tomentose along the margins outside, adpressed pubescent within. *Petals* obovate or suborbicular, equalling or exceeding the calyx lobes. *Carpels* woolly towards the top. *Fruit* $\cdot 4\text{--}6$ in. across, globose, orange or yellow; styles usually collected together towards the apex and falling off in a piece; drupes juicy, palatable, glabrous or floccose, woolly

on the inner face; seeds reticulate pitted; receptacle rugose and densely or sparsely woolly.

KHASI & JAINTIA HILLS 5500-6500 ft., Laitkor Forests. Peak Forests etc.

Flrs. 4-5. Fr. 5-6.

Flowers. & Fruits are borne ordinarily on short lateral shoots bearing leaves with 3 leaflets.

13. *Rubus opulifolius* Bertol.

A straggling shrub; young parts, rachis and inflorescence softly white or greyish tomentose; new shoots often with gland tipped hairs. *Prickles* few, up to .1 in. long, hooked or straight with a flattened base. *Leaves* 3-5 foliolate with few prickles on the back; stipules subulate or linear, .15-.25 in. long. *Terminal* leaflet largest, 1.2-2.5 by 1.2 in., usually irregularly lobed, ovate to ovate-rhomboid in outline; lateral leaflets .7-2 by .5-1.3 in., elliptic to lanceolate, often somewhat oblique at the base, crenate-serrate, acute-acuminate, sometimes subacute, soft, dull green and softly hairy or glabrescent above, clothed beneath with matted wool except on the nerves, which have spreading yellowish hairs; lateral nerves 5-7 on either half, lowest pair from the base; pedicels of lateral leaflets very short. *Flowers* .5 in. across in short congested tomentose racemes up to .7 in. long terminating lateral branches or a few flowers from upper axils; bracts tomentose, subulate or linear up to .25 in. long; bracteoles setaceous, very small; pedicels .15 in. long, stout with or without glandular bristles, elongating in fruit. *Calyx* densely tomentose and with gland tipped bristles outside; lobes about .25 in. long, lanceolate or ovate, acuminate, adpressed silky within. *Petals* about .2 in. long, deep pink, broadly obovate, suborbicular, clawed, erose. *Stamens* numerous; filaments pinkish. *Carpels* clothed with silky hairs. Fruit globose, about .3-.4 in. across; drupels orange or yellow tipped with black, large, succulent; stone pitted, receptacle short, hairy.

KHASI HILLS, usually 5500-6500 ft.

Apt to be mistaken for *R. biflorus* from which it can be easily distinguished by its smaller and fewer prickles, glandular calyx and shoots and its fruits with prominently persistent styles.

14. *Rubus lasiocarpus* Smith. *Shumugam-gamphu, Dieng-soh-khao-iong, Sia-soh-khaw-iong, Kh.; Soh-chi-iong, Sa-kho-iong, Synt.*

A large spreading shrub; branches long, often pruinose, glabrous with age, usually purplish below the bloom; young parts tomentose. *Prickles* stout, hooked or straight, up to .4 in. *Leaves* 5-7, sometimes only 3 or up to 11 foliolate, 3-10 in. long; rachis usually with hooked prickles, tomentose or glabrate with age; stipules .2-.3 in. long, subulate. *Leaflets* 1-4 by .4-2.5 in., terminal often broadest and lobulate, ovate, elliptic or ovate lanceolate, acuminate, acute or subacute, simply or doubly cuspidate, toothed or serrate, subcoriaceous, glabrous or pubescent above, thickly white tomentose beneath; lateral nerves 7-10 on either half, impressed above, prominent beneath, close, straight. *Flowers* .3-.7 in. across, purplish-pink, in terminal and axillary, simple or paniced lax, tomentose corymbs; pedicels of various lengths, usually .1-.25 in. long; bracts linear, small. *Calyx* densely woolly; lobes about .2 in. long, ovate or ovate-lanceolate, acuminate. *Petals* pink or purple pink, obovate or sub-orbicular, usually shorter than the calyx lobes. *Carpels* tomentose, many. *Fruit* .3-.5 in. across; drupes succulent, black when ripe with glaucous bloom, receptacle villous, columnar; stones pitted.

GARO HILLS, N. CACHAR HILLS, KHASI HILLS, usually above 2000 ft., ascending to 6500 ft., often along nalas and streams in low elevations, but by no means confined to such situations in cooler places.

The ripe fruit is sweet and has a delicate flavour. It is much eaten and is also used for jellies and jams wherever available in sufficient quantities. The fruit is however frequently attacked by insects when about to ripen.

Flrs. 3-4. Fr. 5-7.

The flowers and fruits are borne mostly on lateral branches which are borne in leaf axils in the second year on new shoots.

15. *Rubus rosæfolius* Smith. *Soh-sherria, Dieng-soh-bhoroya, Kh.*

A straggling or procumbent shrub; young parts, leaf rachis and inflorescence villous to glabrous, with short or

long, spreading, stiff, purple gland tipped hairs. *Branchlets* green. *Prickles* numerous, sharp, nearly straight with flattened base on older branches, hooked on shoots, leaf rachis and inflorescence. *Leaves* imparipinnate, 5-9-(11) foliolate, often reduced in number at the ends of branches, sometimes to a single leaflet near the inflorescence. *Rachis* of normal leaves 2-6 in. long; stipules $\cdot 2\cdot 3$ in. long, linear-lanceolate. *Leaflets* $\cdot 6\cdot 2\cdot 2$ by $\cdot 3\cdot 1\cdot 2$ in., terminal usually largest and often lobed, ovate to oblong-lanceolate, doubly inciso-serrate, acuminate or acute; base rounded or cuneate, membranous, green on both surfaces, glabrate above, pubescent, sometimes mixed with glandular hairs beneath on the nerves; midrib often prickly; lateral nerves 9-14 on either half, nearly straight, subparallel; petiolules of lateral leaflets very short. *Flowers* white, $\cdot 7\cdot 1$ in. across, terminal or axillary, solitary on stalks, $\cdot 4\cdot 2\cdot 2$ in. long or in lax panicles. *Bracts* resembling the stipules. *Calyx* deeply cleft with or without glandular hairs outside; segments $\cdot 3\cdot 4$ in. long, ovate-lanceolate or oblong, gradually or abruptly caudate-acuminate, reflexed in fruit, glabrate or tomentose along the margins outside, clothed within, except sometimes at the base with dense felted tomentum. *Petals* about as long as or slightly longer than the calyx lobes, obovate or suborbicular, clawed. *Stamens* many. *Carpels* very numerous, glabrous on a villous receptacle. *Fruit* $\cdot 5\cdot 6$ in. long, cylindric or oblong or (in form I) globose and up to $\cdot 7$ in. across. *Drupe*s numerous, small and somewhat dry or succulent and large, orange, yellow or scarlet; seeds rugose.

LAKHIMPUR—Dulong-mukh. GOALPARA—North Sidli Line; N. CACHAR HILLS, KHASI HILLS up to 6500 ft., probably also in other submontane tracts.

Flrs. 2-8. Fr. 3-10, according to altitude.

The above description includes the following varieties :—

Var. *Sorbifolius*. *R. Sorbifolius* Max. Glandular hairs on branchlets long persistent, spreading. *Calyx* densely clothed with glandular hairs. *Fruit* cylindric; drupes very small, almost dry, tasteless, orange or yellow when ripe.

Var. nov *rubrocarpa*; branchlets without or with very few glandular hairs, secondary nerves of leaflets close. *Flowers* and *fruits* larger than in the last variety. *Calyx* without glandular hairs outside. *Fruit* globose to oblong; drupes scarlet when ripe, succulent, edible.

The flowers and fruits are usually borne on short lateral branches, which appear in the second year on the axils of new shoots. The leaves on these lateral branches have mostly 3 leaflets.

KHASI HILLS—Peak forests—6500 ft., also LAKHIMPUR.

The above varieties differ so markedly in their fruits, habits and indumentum that it is probable that we are dealing with two species.

The following variety occurs as an escape in Lakhimpur District and also at Cherrapunji.

Var. *coronarius*, *Rubus sinensis* of horticulturists. A small shrub covered specially on the leaves with minute scales. *Leaflets* 3.5-7 in., terminal sometimes lobulate, 1-2 by .4-1 in., green on both surfaces. *Flowers* white, about 1-2 in. across; double stamens being mostly transformed to petals resembling a small rose. *Carpels* with a few hairs at the top. *Fruit* not known in our area.

Native country unknown—probably S. E. ASIA.

Flrs. almost all the year round.

The following may be mentioned :—

1. *R. khasianus* Card.

A shrub, prickles few, recurved. *Leaves* simple, long petioled; petioles 2.6-3.4 in. long, villous, sparsely aculeate. *Blade* 4.7-5.9 in. by 4.3-5 in., ovate-cordate, 5-lobate, terminal lobe longest, lobes acute, sinuate, more or less toothed, upper surface somewhat rugose with scattered tubercles; nerves pilose, undersurface paler. *Stipules* palmately dissected. *Flowers* in short, axillary or terminal racemes, about 4 in. across; pedicels short, villous; bracts similar to the stipules, apex cut up into narrow segments. *Calyx* campanulate, villous with yellowish silky hairs, segments tomentose within, outer 3, inciso-dentate, inner two subentire. *Petals* white (?), suborbicular, shortly clawed. *Stamens* in many series, apex of connective with few harsh hairs. *Carpels* glabrous; style filiform, glabrous. *Fruit* not known.

KHASI HILLS 3-5000 ft.—*Hk. f. & Thomson* No. 467.

2. *Rubus* sp. near *R. cartægifolius* Bge.

A gregarious undershrub about 3 ft. high, armed with sharp close prickles. *Leaves* longer than broad, lobed, acuminate, unequally serrate, glabrous or nearly so, midrib prickly. Flrs. & Fruit not seen.

In the absence of flowers and fruits it has not been possible to determine the position of this very interesting plant. Probably introduced. Government orchard, Shillong.

3. *R. Burkillii* Rolfe.

A straggling shrub, armed with sharp recurved prickles. *Leaves* simple, 2-4 in. long, broadly ovate to suborbicular in outline, about 5-nerved at the base, somewhat irregularly 3-5 lobed, lobes often rounded, inciso-crenate, hairy along nerves on both surfaces; petioles .5-1.5 in. long; stipules narrow-laciniate. *Flowers* white, 3-7 together, often subcorymbose on short terminal or axillary racemes; pedicels

·2·25 in. long, pubescent. *Calyx* lobes about ·2 in. long, acute, with few lateral segments, thinly pubescent outside. *Petals* obovate, ·2·24 in. *Drupes* few, bright red.

Kobo—Abor Hills.

Fr. 12.

A scandent *Rubus* agreeing in many respects with the above plant has been collected in Mamloo-Khasi Hills (sheet 9363). It may prove to be a local form of the species. It differs from *R. Burkillii* by :—

- (i) its narrower leaves which are longer than broad, sharply acuminate, the lobes being irregular sometimes, completely dividing the leaf into 2 leaflets or almost absent in the upper leaves.
- (ii) more robust corymbs;
- (iii) more densely pubescent calyx with larger number of lacinate lateral segments on the lobes;
- (iv) more succulent drupes.

It is also less prickly on the whole than *R. Burkillii*.

Flrs. & Fr. 9.

***Fragaria indica* Andr.**

A silky pubescent herb with perennial rootstock and slender runners. *Leaflets* usually digitately 3-foliolate; stipules foliaceous, adnate to the slender petiole, 1·5 in. long. *Leaflets* 1·1·5 in. long, obovate, toothed; base cuneate, nerves subparallel. *Flowers* yellow, ·5·1 in. across, solitary on long axillary peduncles equalling the petioles. *Calyx* persistent with 5 long bracteoles exceeding the lobes. *Petals* 5, obovate. *Stamens* many, persistent. *Carpels* many on a convex receptacle. *Fruit* of numerous minute black, achenes on a fleshy red receptacle, spherical, insipid.

Submontane tracts ascending to 6000 ft. in the KHASI HILLS, often covering sheltered banks.

Flrs. & Fr. almost throughout the year.

***Fragaria nilgerrensis* Schdl.**

A stouter herb than the last with perennial rootstock and long runners clothed with long spreading hairs. *Leaves* digitately 3-foliolate; petiole up to 5·5 in. long with more or less sheathing base; stipules adnate to the base of the petiole, broad with scarious margins. *Leaflets* 1·1·5 in. by ·8·1·2 in., obovate, lateral usually oblique, coarsely and sharply toothed, margins pilose, undersurface densely pubescent, nerves prominent beneath. *Flowers* white, ·5·1 in. across, few cymosely arranged on a stout peduncle; pedicels ·8·1·2 in. long. *Calyx* lobes spreading, ovate acuminate; bracts 5, persistent, smaller than the calyx lobes and alternating with them, lanceolate, often cleft at the apex. *Petals* obovate, exceeding the calyx segments. *Stamens* and carpels

many. *Fruit* up to .7 in. across, white with pinkish tinge, subacid; achenes reddish-brown, minute, imbedded in the fleshy receptacle.

KHASI HILLS 5-6500 ft.

The fruit is eaten but is inferior to the wild straw berry of N. W. Himalayas, *F. vesca* Linn.

Potentilla Mooniana Wight. Vern. *Lyngniang-masi*, Kh.

A prostrate or erect hirsute or villous herb with perennial rootstock. *Leaves* 1.5-6 in. long or longer, interruptedly pinnate, larger leaflets alternating with one or more pairs of very small leaflets; rachis silky; stipules membranous or foliaceous. *Leaflets* many, sessile, larger .4-1.5 in. long, elliptic to oblong, smaller, orbicular to cuneate, .1-.4 in. long, all inciso serrate, clothed with spreading hairs beneath. *Flowers* yellow, .3-.5 in. across on congested corymbs or lax panicles with long pedicels. *Calyx* lobes 5, villous, alternating with 5 deeply toothed, more or less lobed bracts. *Petals* 5, obovate-orbicular. *Stamens* many. *Carpels* free, many; style ventral. *Fruit* of minute, smooth, achenes on an elevated hairy receptacle.

KHASI HILLS 4-6500 ft.; common.

The roots are chewed with pan.

Flrs. & Fr. 2-10.

Potentilla fulgens Wall. Vern. *Lyngiang-bru*, Kh.

A prostrate or erect herb attaining 24 in. in height with a stout rootstock, clothed on the stem, inflorescence and leaf rachis with soft spreading hairs. *Leaves* interruptedly pinnate as in the last species, 2-6 in. long; stipules membranous to sessile, foliaceous; leaflets many, sessile, extending to the base of the rachis, larger leaflets .4-1 in. long, obovate to elliptic, smaller, .1-4 in. long, obovate to orbicular, all coarsely serrate, lateral nerves often impressed above, sub-parallel, undersurface villous with silvery white hairs. *Flowers* yellow, .3-.5 in. across, in lax terminal corymbose panicles or congested corymbs. *Calyx* lobes with long spreading hairs; bracts smaller, silvery, entire or lobed. *Stamens* and carpels many. *Achenes* on an elevated villous receptacle.

KHASI HILLS—5-6500 ft., sometimes gregarious in recent clearances.

Flrs. & Fr. 5-9.

Potentilla Kleiniana W & A.

An annual with many slender prostrate hairy stems. *Leaves* digitately 3-5 foliolate; petiole slender, those of radical leaves long, others short; stipules .2-.5 in. long. *Leaflets* obovate or oblanceolate, .3-2 in. long, obtusely toothed. *Flowers* yellow, about .25 in. across, pedicellate in terminal cymes. *Petals* scarcely exceeding the calyx. *Achenes* with sub-parallel wrinkles along the length.

KHASI HILLS 4-5000 ft.

Agrimonia Eupatorium Linn. Vern. *Lynniong-tyinning*, Kh. The Agrimony.

An erect leafy herb with a perennial and more or less woody rootstock, clothed with spreading soft hairs. *Leaves* 2·5-7 in. long, interruptedly imparipinnate with very small leaflets between larger ones; stipules partly adnate to the rachis, large foliaceous up to 1 in. long. *Leaflets* 7-21, sessile, larger 1-3 in. long, obovate to elliptic or lanceolate, smaller ·1-·3 in., cuneate or orbicular, all coarsely toothed, pubescent on both surfaces. *Flowers* about ·25 in. across, yellow, in elongate, terminal, spike-like racemes; pedicels short with 1-3 cleft or fid; bracts ovate acuminate in outline; bracteoles 2. *Calyx tube* ·1-·2 in. long, turbinate, villous, grooved, somewhat enlarged and hardened in fruit, top of tube with a dense ring spines, which become hooked in fruit; lobes 5, elliptic to oblong lanceolate, imbricate in bud. *Petals* 5, oblong-obovate, about ·1 in. long, much exceeding the calyx lobes. *Stamens* about 15, inserted at the mouth of the calyx tube. *Carpels* 2, included in the calyx tube. *Fruit* of 1 or 2 achenes, enclosed in the spinous calyx tube.

KHASI HILLS 4-6000 ft.

Flrs. 4-10.

Poterium longifolia Betrol. Vern. *Bat-tari*, Kh.

A somewhat stiff glabrous herb attaining up to 4 ft., with many branches and stout rootstock. *Leaves* pinnate, 5-16 in. long; stipules adnate to the base of the sheathing petiole, upper foliaceous; leaflets petiolate, ·7-3 in. long, linear oblong, crenate, rigid, nerves prominently reticulate beneath. *Flowers* purple, about ·12 in. long, bracteate and 2-bracteolate, subsessile, collected together in paniced spike-like heads, ·7-2·5 in. long with slender stiff peduncles. *Calyx tube* persistent, compressed, pubescent; lobes 4, in opposite pairs of which one is broader than the other, thickened towards the tip, which is notched and with a mucro in the notch, back with a few hairs. *Petals* 0. *Stamens* 4, with slender filaments. *Disk* closing the mouth of the calyx tube. *Carpel* 1, enclosed in the calyx tube. *Fruit* of 1 achene enclosed in the hardened shortly 4 winged calyx tube.

KHASI HILLS in fallow lands—5-6000 ft.

Flrs. 8-10.

5. SPIRÆA Linn.

Spiræa callosa Thunb. Vern. *Soh-Byrthit*, Kh.

An erect or straggling shrub attaining about 7 ft. in height; branchlets pubescent; young parts grey tomentose. *Leaves* alternate, ·8-2 by ·4-·8 in., ovate oblong to oblong lanceolate or lanceolate, sometimes rhomboid-lanceolate towards the ends of the branches, acute, doubly inciso-serrate; base cuneate, thinly pubescent and ultimately glabrate above,

glaucous and pubescent along the nerves beneath, chartaceous; main lateral nerves 7-9 on either half, prominent beneath, nervules finely reticulated; petiole very short, pubescent; stipules minute, caducous. *Flowers* hermaphrodite, white, often with a touch of pink about .2 in. across in compound, spreading, corymbose, cymes terminating branches. *Pedicels* up to about .1 in. long; bracts linear-lanceolate to spatulate, up to .25 in. long; bracteoles about as long as the calyx, both long persisting. *Calyx* pubescent, about 1 in. long, persistent. *Calyx-tube* obconic, lobes 5, triangular-ovate, reflexed in fruit. *Petals* 5, nearly .1 in. long, orbicular; stamens many. *Disk* lining the calyx tube and ending in a prominent glandular ring. *Carpels* 5, free, villous on the inner face; ovules shining; styles subterminal. *Fruit* of 5, shining follicles, about .1 in. long, thinly hairy or glabrous.

KHASI HILLS about 6000 ft.

Flrs. 6-8. Fr. 8-10.

Spiræa cantoniensis Lour. Syn. *S. corymbosa* Roxb.

A branchy and straggling shrub with purplish or greenish-brown glabrous branchlets. *Leaves* .8-1.5 by .3-.5 in., ovate-oblong to rhomboid, subacute, inciso-serrate on the upper half, entire towards the cuneate and often subtriplinerved base, glabrous above, undersurface glaucous; lateral nerves ascending, straight; petiole .15-.2 in. *Flowers* snow-white, .3 in. across in conspicuous axillary and terminal, umbellate corymbs; pedicels slender, up to .4 in. long. *Calyx* broadly turbinate, about .1 in. long, glabrous; teeth triangular, acute; disk glands prominent as many as, and opposite to stamens. *Petals* orbicular, .15 in. long. *Carpels* free, 5.

Cultivated in the Hills often for hedging and also in gardens in plains.

Flrs. mainly 3, but continue to 5; second flush sometimes in 9-10.

6. NEILLIA Don.

Neillia thyrsiflora Don. Vern. *Torsuin*, Kh.

A branchy shrub with drooping shoots, attaining 6 ft. in height; young parts hairy. *Leaves* 1.5-3.5 by 1.2-2 in., ovate, caudate-acuminate, more or less three lobed, doubly inciso-serrate, dark-green and glabrous above with age, paler and thinly pubescent along the nerves beneath, membranous; base bordered by a pair of strong nerves, subcordate or rounded, often abruptly narrowed along the basal nerves to

the petiole; lateral nerves 4-5 on either half nervules very finely reticulated; petioles .2-.3 in. long, channelled, thinly hairy; stipules .2-.3 in. long, ovate, acute, coarsely toothed. *Flowers* usually in branched terminal or axillary pubescent racemes up to 4 in. long, the latter from upper leaf axils and sometimes simple. *Pedicels* short; bracteoles .2-.3 in. long, persistent, ovate or lanceolate, acuminate, coarsely toothed to almost entirely pubescent. *Calyx* about .25 in. long, campanulate, hairy and sometimes minutely glandular, persistent and glandular-bristly in fruit, lobes 5, about .12 in. long, induplicate, valvate in bud, ovate, caudate acuminate. *Disk* lining the calyx-tube. *Petals* 5, white, about .1 in. long, broadly obovate. *Stamens* 20-25, incurved. *Carpel* 1, free, thinly hairy; style subterminal, shortly extruded; stigma capitate; ovules 8-12 in two collateral rows. *Fruit* a coriaceous follicle almost enclosed in the calyx tube. *Seeds* small, brown, polished, marginally ridged, albuminous; testa hard, inflated.

KHASI HILLS, 5-6000 ft.

Flrs. 5-6. Fr. 8-11.

7. ROSA Linn.

Sarmentose, climbing or erect shrubs, usually prickly. *Leaves* imparipinnate; leaflets serrate; stipules adnate to the petiole. *Flowers* terminal, solitary or in corymbs, white, red or yellow; bracts usually deciduous. *Calyx tube* persistent, globose or ovoid with contracted mouth, lobes foliaceous. *Petals* 5 (in several series in cultivated plants) large. *Stamens* numerous, inserted on the edge of the disk. *Disk* lining the calyx tube and nearly closing its mouth. *Carpels* usually many at the bottom of the calyx tube; styles subterminal, free or connate above; stigma thickened; ovule 1, pendulous. *Achenes* coriaceous or bony, enclosed in the fleshy calyx tube, forming a pseudo-baccate fruit.

Prickles scattered, recurved; leaflets large,
entirely glabrous; flowers in spreading
corymbs; pedicels over .7 in. long; styles
connate.

1. *R. longicuspis*.

Prickles mostly in infrastipular pairs, straight; leaflets small, usually with pubescent midrib; flowers solitary or in congested racemes; pedicels under .4 in. long; styles free.

.. 2. *R. involucrata*.

1. *Rosa longicuspis* Bertol. Vern. *Shia-khari*, *Shia-soh-mei*, Kh.

An evergreen tall and often very strong climber with a stout stem; branchlets glabrous; prickles scattered, recurved, strong. *Leaves* 3-6.5 in. long, rachis often glandular and prickly; stipules .5-.7 in. long, free portion subulate, lanceolate or ovate with glandular margin. *Leaflets* 5-7-(9), sometimes 3, 1-3 by .5-1.2 in., lower gradually smaller, ovate to oblong-lanceolate, caudate or short acuminate, serrate, subcoriaceous, glabrous; lateral nerves 7-11 on either half, very slender; petiolules very short. *Flowers* white, about 1.5 in. across, fragrant in terminal simple or compound corymbs; pedicels .7-2 in. long, pubescent and with deciduous glandular bristles; bracts up to .6 in. long, lanceolate-caudate, glandular. *Calyx tube* .25-.3 in. long, broadly obovoid, pubescent outside; lobes .5-.8 in. long, ovate or lanceolate with a caudate apex often with a few long teeth on the margins, pubescent and glandular outside, tomentose within. *Petals* .6-1 by .5-.7 in., broadly obovate or obcordate, silkily tomentose outside. *Styles* connate, exserted, column villous; stigmas expanded. *Fruit* obovoid or globose, .4-.5 in. across, brown when ripe, crowned by the calyx lobes; achenes .15 in. long.

KHASI HILLS, 5-6000 ft., usually in cool situations.

Flrs. 4-5. Fr. 10.

2. *Rosa involucrata* Roxb. Vern. *Nahor-katani*.

A compact bush; bark almost black, thin, blaze brown; young parts and inflorescence grey or brownish tomentose. *Leaves* 2-4 in. long; rachis pubescent or ultimately glabrescent, sometimes prickly, usually with a pair of infrastipular, straight, compressed, prickles; stipules .2-.3 in. long, laciniate, adnate to the common petiole. *Leaflets* 7-9, shortly stalked, .6-1.25 by .2-.6 in., oblong to elliptic-lanceolate, broadly acute or obtuse, finely serrate with

deciduous bristly tips, coriaceous, dark-green and glabrous above, usually pubescent along the midrib beneath; lateral nerves fine, rather indistinct. *Flowers* white, 1·5-2 in. across, in short few flowered terminal corymbs or solitary; peduncles stout, much shorter than the leaves; pedicels short; bracts up to ·7 in. long, lanceolate in outline, densely tomentose, irregularly cut up along the margins into setose teeth or segments. *Calyx* tube globose, ·2·3 in. across, brown or greyish velvety outside; lobes ·5·7 in. long, lanceolate or ovate-acuminate, pubescent within, deciduous in fruit. *Petals* ·7·1·2 in. long, broadly obovate, retuse at the apex, glabrous. *Styles* free; stigmas discoid hairy, collected together into a cushion-like mass. *Fruit* ·4·5 in. long, globose, tomentose.

Edge of sluggish streams in SIBSAGAR, SYLHET, GARO HILLS, GOALPARA, probably in other Districts as well.

The stipules, peduncles and bracts are sometimes glandular. The trunk is quite stout and the wood is cream coloured.

Flrs. 2-4. Fr. 5-7.

A concise synopsis of roses ordinarily cultivated in India is given in Brandis Forest Flora p. 199-201 and reproduced with few modifications by Hooker in Flora of British India Vol. II. P. 364. The climate of Assam does not seem to be so well suited for the growing of European roses as that of the other provinces of Northern India. Of the many kinds which thrive the following may be mentioned :—

1. **Rosa damascena** Mill. Vern. *Golap*. Prickles unequal, mixed with a few glandular bristles, larger ones hooked. *Flowers* scented, pink; sepals reflexed after flowering.

The commonest garden rose in the province.

2. **Rosa centifolia** Linn. Vern. *Golap*, Cabbage, Moss or Provence rose. *Prickles* unequal, mixed with numerous glandular bristles; leaflets and calyx glandular-ciliate. *Flowers* scented.

In this province it has a tendency to become very leafy with few flowers. Commonly used as stock for grafting better class roses on.

3. **Rosa microphylla** Lindl. *Branchlets* weak, prickles infrastipular; leaflets small, 9-15. *Flowers* pale pink, double. *Calyx* densely clothed with long bristly prickles.

Grown often in the hills, quite hardy.

4. **Rosa Banksiæ** R. Brown. Lady Banks' rose. Scandent and almost unarmed; leaflets 3-5; flowers white or yellow in dense corymbs. Common in Shillong.

5. Rosa multiflora Thunb. Climbing, prickly. *Flowers* pink to deep red in dense massive corymbs. *Petioles*, peduncles and calyx tube pubescent.

Common in hedges and gardens in KHASI HILLS where it is a conspicuous feature during May. It also seems to be spreading in the vicinity of the town as a naturalized plant.

6. Rosa indica Linn. Syn. *R. chinensis* Jacq. Vern. Kanta golap, Beng. Glabrous, prickles equal, evergreen; stipules adnate nearly to the apex; flowers large, double to single, white rose purple or yellow on long pedicels; calyx segments reflexed. The numerous hybrid perpetuals of florists, the tea roses and the Bengal and China roses belong here. The last two groups are usually strongly scented.

Some of the roses commonly found are hybrids between this *R. damascena* and *R. centifolia*.

7. Rosa alba Linn. Vern. *Shwet golap*, Beng.—A spreading subsucculent shrub; prickles scattered, unequal; leaflets 5-7, large, greyish, rugose, downy and pale beneath. *Flowers* white or of a delicate blush tint, usually double; calyx segments pinnatifid.

8. DOCYNIA Dcne.

Trees, young parts usually woolly. *Leaves* deciduous, simple lobed in young plants; stipules deciduous, subulate. *Flowers* white, solitary or fascicled. *Calyx tube* tubular at the free end, lobes ultimately reflexed. *Petals* 5, with long woolly claws. *Stamens* 30-50, inserted at the throat of the corolla tube; anthers dorsifixed. *Ovary* adnate to the calyx tube, 5-celled; styles connate and woolly below the middle, upper portion free; ovules superposed, 3 in each cell, lowest basilar. *Fruit* a pyriform rounded or ovoid pome; endocarp tough; seeds plano-convex, testa coriaceous.

Pedicels .4-1 in. long; calyx tube elongated clavate; fruit longer than broad. 1. *D. indica*.

Pedicels .2-.4 in. long, stout; calyx tube turbinate or pyriform, short; fruit not longer than broad. 2. *D. Hookeriana*.

1. Docynia indica Dcne. Vern. *Soh-phoh*, *Dieng-soh-phoh-soh*, *Saw*, Kh. The Indian crab apple.

A moderate sized to tall deciduous tree, young parts and inflorescence woolly. *Bark* cinereous brown or grey usually with white blotches, warty with lenticels, nearly smooth on upper parts of stems, rough with dark patches on older parts towards the base; blaze light dun brown with white bands,

deeper layers, whitish brittle, about .25 in. thick. *Leaves* 2.4 by .9-2.2 in., ovate or oblong lanceolate, acuminate, serrate or serrulate or almost entire, coriaceous and glabrous when mature; lateral nerves 6-9 on either half, obliquely arcuate; base rounded and often entire; petiole .5-1.2 in., ultimately sparsely hairy or glabrescent; stipules .15-.2 in. long, subulate, reddish, early deciduous. *Flowers* about 1 in. across in fascicles of 2-3 or solitary; pedicels .4-1 in. long, dilated upwards. *Calyx* woolly outside; tube .25-.3 in. long, elongated, clavate; lobes narrow lanceolate, acuminate, sometimes with minute deciduous glands on the margin, woolly at the base, thinly pubescent or glabrescent upwards, .5-.6 in. long. *Petals* spreading, obovate-oblong, .5-.6 in. long, claw about .1 in. long. *Filaments* unequal, subulate, glabrous. *Pome* pyriform, 1-1.5 in. long, rugose when young, smooth with age, crowned with the remains of the calyx lobes. *Seeds* 3 in each cell.

KHASI HILLS, wild and cultivated.

The acid fruits are eaten both raw and cooked. It is sometimes used as stock for grafting apple on.

The wood is used for tool handles and the branches make good walking sticks.

Young plants are spinescent and have lobed and coarsely serrate leaves.

Flrs. 2-3. Fr. 8-9.

2. *Docynia Hookeriana* Dcne. Vern. *Soh-phoh-heh*, *Dieng-soh-pho*, Kh.

A large tree with spreading branches; young parts and inflorescence densely covered with deciduous wool. *Bark* dark-grey or black, rough, exfoliating in roundish flakes, .5-.75 in. thick; blaze cheesy lightbrown, with vertical lines, turning dark-brown on exposure. *Leaves* 1.7-3.5 by .6-1 in., (4-5 in. long according to Hooker) narrow oblong or ovate lanceolate, long acuminate, serrate on the upper $\frac{3}{4}$ rd, coriaceous; lateral nerves 7-10 on either half, obliquely arcuate; petiole .2-.7 in. long; stipules caducous, subulate, .15-.2 in. long. *Flowers* 1 in. across, solitary or in fascicles of 2-3; pedicels stout, .2-.4 in. long. *Calyx tube* densely woolly, 1.5-2 in. long, broad, turbinate or pyriform, constricted at the top, lobes .3-.4 in. long, often with minute

deciduous glands on the margin. *Petals* .4 in., broadly elliptic or suborbicular, abruptly narrowed to the minute claw. *Pome* contracted below the remains of the sepals, broad pyriform?

Hardly more than a variety of the last species which it closely resembles. The fruit is of different shape and much broader.

The wood is used for tomtoms and drums and the fruit is eaten.

Flrs. 2-3. Fr. 9.

9. ERIBOTRYA Lindl.

Small or large trees or sometimes shrubs. *Leaves* simple, serrate or entire, coriaceous; stipules lanceolate or broad. *Flowers* pentamerous, white, in dense panicles. *Calyx* tube adnate to the ovary, lobes small, erect or spreading, persistent. *Petals* 5, contorted or imbricate in bud, obovate, orbicular, usually notched and oblique, margins sinuate, claw woolly or glabrous; stamens many. *Ovary* 2-5 celled; styles 2-5, connate and woolly below; ovules 2 in each cell, basal, ascending. *Fruit* a succulent or dry berry, rarely 2-celled; endocarp membranous, usually 1, less often 2-3 seeded. *Seeds* large, angled, cotyledons very thick.

I. Indigenous species. Style 2-3.

a. A stiff shrub. Leaves linear-oblongate or lanceolate, pointing upwards.

1. *E. angustissima*.

b. Trees:—

Leaves thickly coriaceous, usually over 2 in. broad, long petioled, small to mod. sized trees.

2. *E. bengalensis*.

II. Cultivated species. Styles 5.

3. *E. japonica*.

1. *Eriobotrya angustissima* Hk. f. Vern. *Soh-thyllong*, *Dieng-sarang*, *Dieng-soh-thlong*, Kh.

A rigid evergreen shrub up to 10 ft. high, often gregarious on river banks. *Stem* brown plain; blaze light-brown, turning yellowish brown; branchlets often prominently marked with leaf scars; young parts rusty or brown woolly, soon becoming glabrous. *Leaves* often close together and appearing subopposite, usually pointing upwards, 2.4-5 by .4-.8 in., linear oblongate or lanceolate, subacute, bluntly short, acuminate, obtuse or rounded, distantly serrate on the upper half, stiffly coriaceous, glabrous, dark-green above;

lateral nerves 8-11 on either half, upper usually ending in serratures, base attenuated to the short petiole, dilated at the base; stipules minute, subulate. *Flowers* white, about .3 in. across in dense terminal corymbose panicles, 1.2-2.2 in. long, buds rusty or brown tomentose, ovoid or subglobose; bracts and bracteoles rusty pubescent; lowermost linear spatulate up to .6 in. long, gradually smaller upwards; bracteoles ovate to subulate, uppermost opposite at the base of the calyx, tube minute; pedicels .1-.15 in. long, stout. *Calyx tube* turbinate, about .15 in. long, pubescent or puberulous, glabrous with age; lobes very short, oblong-obtuse, densely woolly along the margins. *Petals* contorted, imbricate in bud, white, .15-.2 in. long, broadly obovate or suborbicular, usually notched at the apex, villous at the base (claw) inside. *Stamens* 20; filaments subulate, glabrous. *Styles* 3, shorter than the stamens, base and crown of ovary woolly. *Berry* pyriform, yellow when ripe, speckled, .6-.75 by .4-.5 in., 2-3 celled, not more than 2-seeded, edible.

KHASI and JAINTIA HILLS, 4500-5500 ft., Rongangiri, GARO HILLS, DC.

Old leaves yellow to red.

Flrs. 3-4. Fr. 10.

2. *Eriobotrya bengalensis* Hook. f. Vern. *Dieng-sijnerei*, *Dieng-la-bysu*, Kh.; *Ching-nei-lei*, Naga; *Theng-okri-arong*, Mik.; *Laru-bandha*? Ass.; *Bolanchin*, Garo.

A medium sized or large tree; bark grey or dark-grey, plain or with shallow vertical furrows about 1 in. thick and warty about .15-.2 in. thick. *Blaze* yellowish with white lines, turning brown on exposure; branchlets stoutish, young parts brown tomentose. *Leaves* very variable, 4.5-10.5 by 2.2-5 in., elliptic-oblong, lanceolate or obovate, short acuminate, often abruptly, sometimes obtuse, coarsely serrate, thickly coriaceous, glabrous and shining above, glabrate or slightly puberulous along the nerves beneath when mature; lateral nerves 8-15 on either half, forked near the margin, branches usually ending in serratures; base abruptly cuneate or gradually attenuate; petiole .8-2 in., dilated at the base; stipules linear-oblong, acute or acuminate with persistent broad bases, up to .8 in. long. *Flowers* white, fragrant,

·3 in. across. *Panicles* terminal, 3-5 in. long, pubescent, ultimately glabrous. *Bracts* caducous; pedicels tomentose, ·15 in. long, glabrous in fruit. *Calyx tube* ·15-·2 in. across, densely pubescent, obconic, lobes ovate acute or obtuse, woolly on the margins. Petals broad ovate or orbicular, contorted in bud, claw woolly, about ·15 in. long. *Stamens* about 20; filaments subulate. *Styles* usually 3, sometimes 2, base of the style and crown of ovary woolly. *Berry* 1-celled, glabrous, ·75 in. long.

KHASI and JAINTIA HILLS, up to about 4500 ft., CACHAR, SIBSAGAR, LAKHIMPUR? (sheet No. 6865), GARO HILLS.

Wood light reddish-brown, even grained, medullary rays of two kinds—several very fine between comparatively broader rays, takes a good polish.

Flrs. 9-10. Fr. 3-4.

Var. *parvifolia*.—Leaves comparatively narrower, 3-7 by ·5-2 in., narrow lanceolate to oblong-lanceolate, sometimes oblanceolate, acuminate or caudate-acuminate, thinly coriaceous; base gradually attenuate; petiole ·5-·9 in. long, lower bracts 3-lobed, up to ·3 in. long; styles woolly nearly to the top. *Berry* not seen.

SIBSAGAR-Mikir Hills, N. CACHAR HILLS, GARO HILLS-Sanitarium Hill (sheet No. 5238). A remarkable form growing to a much larger size and with rather different leaves than the type.

3. *Eriobotrya japonica* Lindl. Vern. *loquat* Hin.

A moderate sized tree with stout branches; young shoots, leaves beneath and inflorescence densely covered with tawny or brown wool. *Leaves* 6-11 by 1·5-3·2 in., oblanceolate, acuminate or acute, subentire or distantly serrate, glabrous above, toughly coriaceous; lateral nerves 12-16 on either half ending in serratures; base narrowed into a very short, stout, woolly petiole. *Panicle* shorter than the leaves, branches stout. *Flowers* ·4-·5 in. across, crowded; bracts and bracteoles ovate. *Calyx* densely woolly outside, tube short, lobes ovate, obtuse or subacute. *Petals* ·3 in. long, broad ovate or orbicular, with a woolly claw. *Styles* 5. *Berry* 1-1·5 in., pyriform, intruded at the top, yellow or orange when ripe, 1-5 seeded.

Cultivated up to 5000 ft.; does fairly well in most districts.

10. PYRUS Linn.

Trees or shrubs with deciduous usually simple, less often pinnate leaves; stipules deciduous. *Flowers* white, red or pink, in terminal cymes or corymbs, bracteate. *Calyx tube* urceolate, turbinate or obconic; lobes 5, erect or reflexed, persistent or deciduous. *Petals* 5, imbricate in bud. *Stamens* 20 or more. *Disk* annular or lining the calyx tube. *Carpels* 2-5, connate, adnate to the calyx tube; styles 2-5, free or connate below; ovules 2 in each cell. *Fruits* 2-5 celled pome, cells lined with a cartilaginous or coriaceous, often 2-valved endocarp, each with 1-2 seeds.

I. Styles 3-5 :—

A. Mature leaves glabrous or glabrescent beneath :—

Calyx lobes deciduous in fruit :—

Styles united towards the base,
fruit red when ripe, .3 in. across. 1. *P. baccata*.

Styles free; fruit brown, spotted,
.5-1.5 in. across. .. 2. *P. Pashia*.

B. Mature leaves woolly-tomentose beneath; calyx lobes persistent in fruit;
fruit .5-.75 in. across. .. 3. *P. vestita*.

II. Styles 2-3 :—

Calyx lobes deciduous; fruit umbonate :—

Fruit obtusely 3-4 angled, warted. .. 4. *P. khasiana*.

Fruit not angled nor warted :—

Umbo less than third of the
diameter of the fruit; fruiting
corymb densely warted. .. 5. *P. cuspidata*.

Umbo about half the diameter of
the fruit; fruiting corymb with
small lenticels. .. 6. *P. polycarpa*.

1. *Pyrus baccata* Linn. Vern. *Soh-shur-um*, Kh.

A small tree branched from near the ground; bark dark-brown, almost black, splitting in rectangular flakes, pale dun-brown, turning deeper yellow to brown on exposure; branchlets hairy, soon becoming glabrous. *Leaves* 1.5-3 in. by .8-1.5 in., elliptic, lanceolate or oblong-lanceolate, sometimes suborbicular, acute or acuminate, serrate, thinly coriaceous, glabrous or pubescent beneath on the main nerves; lateral nerves 5-7, distant, arcuate; petiole .5-1.5 in. long, slender or glabrescent with age. *Flowers*

white, 1-1.5 in. across in umbels or fascicles at the ends of short branches; pedicels slender, 1-2 in. long, glabrous or with few hairs. *Calyx tube* urceolate, .2 in long, glabrous or tomentose; lobes deciduous, about as long as or slightly exceeding the tube, lanceolate acuminate, tomentose within. *Petals* variable in length and breadth. *Styles* 3-5, united and woolly towards the base. *Fruit* about .3 in. across (in the form found in our area), scarlet when ripe, globose, depressed at the apex, endocarp crustaceous.

KHASI and JAINTIA HILLS.

Flrs. 3-4. Fr. 9-10.

2. *Pyrus Pashia* Ham. Vern. *Soh-shur*, *Soh-jhur*, Kh.

A medium sized deciduous tree, bark rough, dark-grey to almost black, furrowed on old stems, nearly smooth and dark-brown on branches; blaze light red, turning light yellowish-brown; young parts and inflorescence covered with dense white wool. *Leaves* 1.8-4 by .9-1.5 in., ovate-elliptic, lanceolate or lanceolate-acuminate or sometimes caudate, finely serrate to crenate, specially when young, glabrous or glabrescent beneath when mature, subcoriaceous; lateral nerves 7-10 on either half, more prominent above; petioles .8-2 in. long, slender; stipules caducous, .4-.5 in. long, setaceous. *Flowers* white, .8-1 in. across in short corymbs, umbels or fascicles at the ends of short lateral branches. *Pedicels* .5-2 in. long, woolly when young; bracts resembling the stipules. *Calyx tube* about .15 in. long, woolly or glabrate, urceolate, deciduous, .1-.15 in. long, ovate acute, woolly within; disk nearly closing the mouth of the calyx tube. *Petals* obovate or suborbicular, .3-.4 in. long. *Stamens* 25-30. *Carpels* 3-5. *Styles* free, more or less woolly at the base. *Fruit* .5-1.5 in. across, globose, depressed at the top, somewhat rough with raised white specks, dark-brown when ripe, endocarp crustaceous.

KHASI & JAINTIA HILLS, 5000-6500 ft.

The fruit is eaten when nearly half-rotten.

Flowers with new leaves 3-4. Fr. ripen 12-1. Old leaves dry black.

The young plant is armed strong, often leaf-bearing spines and has 3-5 lobed leaves. It is very suitable stock for grafting pears on.

P. sinensis Lindl. Vern. *Naspati rit*, Kh.; *Naspati*, Beng., Ass., Nep. The Chinese or sand pear.

A medium sized deciduous tree with rough grey bark. *Leaves* 2.5-6 by 1.5-3.5 in., broadly ovate to elliptic lanceolate or elliptic, acuminate, finely serrate, glabrous, glossy and dark-green above; lateral nerves ascending, 7-10 on either half, more prominent above; petiole 1-2 in. long, slender, channelled above; stipules linear, short. *Flowers* white, about 1.25 in. across, corymbose on short lateral shoots; pedicels 1-1.5 in. long, much thickened and lenticellate in fruit. *Calyx* tuberculate, glabrous or puberulous; lobes deciduous. *Petals* suborbicular; styles free, not woolly. *Fruit* 3-5 in. across, globose to pyriform, depressed at the apex, rough with close raised specks, yellowish green, sometimes partly scurfy when ripe; pulp very gritty.

Largely cultivated and bears often profusely in the hills. Sometimes naturalized in the KHASI HILLS. The serratures are tipped with minute deciduous bristles.

Flrs. 3-4. Fr. 7-9.

P. communis Linn. Vern. *Naspati*. The pear.

Very similar and probably not specifically distinct. A deciduous tree sometimes with spinescent branches. *Fruit* usually pyriform, smoother and more yellowish outside, pulp not gritty.

Cultivated with some success at Shillong but the fruit does not attain the same quality as it does in other hill stations.

P. Malus Linn. The apple. Vern. *Seb*, Hin.; *Aple* Beng., Ass.

A small deciduous tree; branchlets tomentose. *Leaves* 2-3 in. long, ovate, acuminate, serrate or crenate, more or less tomentose beneath. *Flower* pale pink. *Fruit* globose, depressed at each end, and crowned with the persistent calyx lobes.

Cultivated at Shillong, with some success, but the fruit is much inferior to those produced in the hills of N. W. India.

3. **Pyrus vestita** Wall. Var. *khasiana* Hk. f.

A tree with densely ferruginous or greyish woolly young parts. *Leaves* 3.5-4.5 by .8-1.2 in., lanceolate or oblanceolate, acuminate, somewhat distantly dentate-serrate, entire towards the base, glabrescent above, densely felted beneath; lateral nerves 10-12; base cuneate; petiole .3-.6 in. long, channelled; stipules linear, about .4 in. long. *Flowers* about .3 in. across, in terminal and subterminal woolly corymbose panicles, broader than long. *Calyx* woolly, turbinate, lobes short, persistent. *Petals* woolly within; styles 3-5, hairy only at the base. *Fruit* globose or pyriform, about .7 in. across.

KHASI HILLS, 5000 ft.—*Mann*. There are no specimens at Sibpur.

The type has larger leaves which are 4-8 in. by 2-5.5 in., ovate-elliptic, oblong or lanceolate. Of this there is no record from our area.

Flrs. 5-6. Fr. 10-11.

4. *Pyrus khasiana* Dcne.

A small tree (according to Hooker a tolerably large tree); young parts and inflorescence cottony floccose; branchlets glabrous, speckled with lenticels. *Leaves* 2.7-6 by 1.2-3 in., lanceolate to elliptic ovate, often abruptly sharp-acuminate, acute or cuneate at the base, sharply serrate, coriaceous, glabrous with age; lateral nerves prominent beneath, 8-12 on either half, subparallel, nearly straight, tertiaries fine; petiole .5-1 in. long, dilated towards the base. *Corymbs* branched, the lower arising in upper leaf axil. *Flowers* white, .3-.4 in. across when fully opened; pedicels stout, .1-.15 in. long, much enlarging and glabrous in fruit. *Calyx tube* .2 in. long, at first cottony tomentose, .2 in. long; calyx lobes deciduous, broadly triangular; petals about .15 in. long, suborbicular-obovate. *Styles* 3-4, glabrous. *Fruit* about .3-.4 in. across, globose, obtusely 3-4 angled, somewhat rough and dotted with raised specks outside, crowned by a depressed umbo with a conical centre, 3-4 celled, pulp granular, endocarp crustaceous, cells 1 seeded.

KHASI & JAINTIA HILLS, Laitkor, Nungbru Wood-Griffith, Myrung, 4500-6000 ft., MANIUR;—not common.

Fr. 7-8.

Pyrus granulosa Bertol. Vern. *Dieng-soh-iong-throng*, Kh.

A moderate sized deciduous tree with thin pale, grey and rather rough bark; young parts and inflorescence flocculent cottony. *Leaves* 3.5-5.5 by 1.5-2.5 in., ovate-lanceolate to ovate-elliptic, acuminate; base acute, rounded or cuneate, sharply serrate, nearly entire towards the base, glabrous with age; lateral nerves 8-10, slightly curved; petiole .6-1 in. long, ultimately glabrous. *Flowers* white, about .25 in. across in terminal, compound corymbs, the lower branches sometimes from upper leaf axils. *Calyx* at first cottony tomentose, ultimately glabrous; pedicels much enlarged in fruit. *Fruit* .5-.7 in. across, globose or subpyriform, warty, turning purplish black in ripening—Kurz,—3-4 celled, obtusely angled when dry, with a depressed umbo with a short blunt cone in the centre, flesh granular.

KHASI HILLS 5-6500 ft.—not common, sometimes epiphytic.

Hardly more than a variety of *P. khasiana*. The leaves have usually fewer nerves, and the fruits are larger, and not angled. The shape and venation of the leaf on which separation of the two species is based in F. B. I. are not constant characters.

Fr. 5-7.

5. *Pyrus cuspidata* Bertol.

A medium sized deciduous tree. *Bark* dark-brown or pale-grey, rough, hard, fibrous and pale to reddish-brown inside; branchlets stout with prominent oblong-lenticels, which coalesce in old branches and often form raised transverse lines; young parts and inflorescence clothed with flocculent wool. *Leaves* 3-5 by 1-2 in., ovate to oblong-lanceolate or elliptic ovate, somewhat coarsely cuspidate-serrate; base rounded to suddenly cuneate, subcoriaceous, glabrous when mature; lateral nerves 10-12 on either side, slightly bent, tertiaries subparallel, close; petiole .8-1.5 in. long; stipules caducous, about .2 in. long, subulate. *Flowers* .25 in. across, white in terminal pyramidal panicles of corymbs, 1.5-3 in. long, densely warted with raised lenticels in fruit; pedicels slender. *Calyx* tube .1 in. long, turbinate at first, woolly glabrescent with age; lobes deciduous, about as long as the tube, triangular, acuminate, often with somewhat blunt tip, glabrous within except for the woolly tip. *Petals* about .1-.12 in. long, obovate to suborbicular, caducous, woolly inside, with a short puberulous claw. *Style* 2-3, united at the base, glabrous; stigmas with a central groove. *Fruit* .2-.3 in. across, globose or subpyriform, glabrous, not dotted, 2- less often 3-celled, apex with a depression and conical umbo.

KHASI & JAINTIA HILLS 4000 ft.

Wood reddish-brown, hard, seasons and polishes well; pores uniform, medullary rays fine.

Flrs. 3-4. Second flush (?) 10-11. Fr. 11-12.

6. *Pyrus polycarpa* Hk. f. Vern. *Dieng-loporam*, Synt.

A small tree; young parts clothed with flocculent tomentum. *Bark* rough grey; blaze fibrous, light-red, turning brown; branchlets with elongated lenticels. *Leaves* 2.5-5 by 1-2.5 in., lanceolate to ovate lanceolate, acuminate or caudate, closely and often unequally serrate; base cuneate,

often thin, slightly unequal, connate-often abruptly, entirely glabrous when mature, thinly coriaceous; lateral nerves 8-12 on either half; petioles $\cdot 6\text{--}1\cdot 3$ in. long, slender, finely channelled. *Flowers* not seen, but according to Hooker $\cdot 3$ in. across in glabrous and smooth corymbs; pedicels slender. *Calyx tube* rather pyriform, limb expanded, lobes deciduous in fruit. *Petals* obovate, sessile, glabrous; styles 2, united to above middle, glabrous. *Fruiting* corvmb branched, more or less bearing at the ends of the branches, dotted with small raised lenticels, which are not so prominent as in *P. cuspidata*. *Fruit* $\cdot 15\text{--}\cdot 25$ in. with a large depressed umbo about half the diameter of the fruit with a bluntly conical centre.

KHASI HILLS 4500-6500 ft.

Flrs. 3-4. Fr. 11-2?

11. STRANVÆSIA Lindl.

Stranvæsia glaucescens Lindl. Vern. *Dieng-sia-saw*, *Dieng-soh-sao-chi*, Kh.

A small or medium sized tree with a spreading crown attaining 80 ft. in height and 8 ft. in girth. *Bark* brown to dark-grey or almost black and rather rough, exfoliating in irregular pieces; blaze pinkish, turning reddish-brown, arrested shoots sometimes ending in spines; young parts and inflorescence clothed with deciduous tomentum. *Leaves* $2\cdot 4\text{--}5$ by $\cdot 7\text{--}1\cdot 7$ in., obovate-lanceolate or oblong-ob lanceolate, acuminate, acute or obtuse and apiculate serrulate or finely serrate, sometimes entire, coriaceous, dark-green and shining above undersurface paler, pubescent beneath when young, glabrous with age, coriaceous; lateral nerves 10-14, very slender; base narrowed to the petiole, which is $\cdot 4\text{--}\cdot 75$ in. long, glabrous or sometimes puberulous; stipules deciduous, subulate, up to $\cdot 2$ in. long. *Flowers* white, about $\cdot 5$ in. across, many in terminal spreading compound corymbs, $2\text{--}4$ in. across; primary branches floriferous at the ends, lower axillary; pedicels up to $\cdot 3$ in. long. *Calyx tube* obconic, woolly; limb spreading, 5 lobed; lobes erect, acute, persistent in fruit. *Petals* 5, overlapping in bud, spreading, broadly obovate, clawed, claw glabrous. *Stamens* about 20. *Ovary*

5-celled, crown short, villous; styles 5, connate to more than half way up, column villous at the base; stigma capitate; ovules 2 in each cell, collateral, basal. *Fruit* about .3 in. across, globose, rather fleshy, orange yellow and glabrous or sparsely hairy when ripe, with a 5-celled, crustaceous, loculicidally dehiscent endocarp, the crown of which is exserted; cells 1-seeded.

KHASI HILLS 4000-5000 ft.,—3000-4000 ft., (locality not mentioned) according to a sheet of Mann's.

Timber pinkish when freshly cut, turning afterwards to reddish-brown, pores numerous, small, med. rays fine, uniform, seasons and polishes well.

Flrs. 5-6. Fr. 10-1.

12. PHOTINIA Lindl.

Evergreen trees or shrubs. *Leaves* simple, coriaceous, entire or serrulate; stipules subulate. *Flowers* small in spreading corymbose terminal panicles, white; bracts deciduous. *Hypanthium* obconic, enlarging in fruit; sepals 5, short, persistent. *Petals* 5, obovate or suborbicular, spreading. *Stamens* 20 or more. *Ovary* $\frac{1}{2}$ inferior, free portion hirsute, usually 2, rarely 3-celled; styles 2, rarely 3, free or combined at the base; stigmas broad; ovules 2 in each cell, collateral, ascending. *Fruit* a small, globose or ovoid, drupe with 1-2 pyrenes each in a membranous or crustaceous endocarp. *Seeds* 1-2 in each pyrene, obovoid, triquetrous or compressed, testa coriaceous.

Leaves 4.5-9 in. long. 1. *P. Notoniana*.

Leaves 1.5-4.25 in. long; petioles under

.7 in. 2. *P. integrifolia*.

1. Photinia Notoniana W & A. Vern. *Dieng-khau-soh-riu*, *Dieng-soh-lar-maw*, *dieng-biai*, Kh.; *dieng-soh-laklong*, *Dieng-sa-halim-blai*, Synt.

A handsome moderate sized to large tree according to locality, all parts glabrous except the inflorescence. *Bark* greenish-grey or brown, somewhat rough, exfoliating in thin scales, irregularly warty, thin, blaze yellowish or light brown with white lines, turning darker on exposure. *Leaves* variable, 4.5-9 by 1.5-3 in., elliptic, lanceolate or oblanceolate to

oblong, entire, obliquely acuminate, sometimes caudate, margins irregularly undulate, coriaceous, dark glossy green above, paler beneath, turning coppery to bright red before falling, midrib stout; main lateral nerves fine, about 10-15 pairs mixed with many minor ones; base sub-acute or rounded, often unequal; petiole .6-1.5 in., stout, more or less channelled; stipules minute, subulate, long persistent. *Flowers* white, .25-.35 in. across in spreading terminal corymbose panicles, up to 8 in. across, broader than long, panicle branches glabrate to hoary pubescent; bracts about .1 in. long, caducous, reddish-brown, tricuspidate with a central subulate awn much exceeding the others, woolly at the apex, broadened and concave at the base. *Calyx* .1 in. long, (including the hypanthium) whitish, glabrous; segments minute, triangular, acute. *Petals* .1 in. long, imbricate in bud, broadly obovate or suborbicular with a very minute claw, glabrous, ultimately reflexed. *Stamens* subulate; free portion of the ovary villous; styles 2, glabrous. *Drupe* .2 in. across, globose or ovoid, yellow when ripe, crowned by the calyx teeth, somewhat rough, endocarp soft, rarely both seeds in each pyrene developing.

KHASI & JAINTIA HILLS, 4-6000 ft.

Wood reddish-brown, hard, close grained, with fine medullary rays, capable of taking fine polish but liable to crack, weight 57 lbs. per c. ft. (Gamble).

Sometimes an epiphyte in early life. Young leaves deep pink along the nerves.

Flrs. 2-3. Fr. 6-7.

Var. *eugenifolia*, *P. eugenifolia* Lindl. *P. micrantha* Dcne.—Panicle branches hoary pubescent.

Var. *macrophylla*—leaves caudate-acuminate, panicle glabrous or nearly so.

2. *Photinia integrifolia* Lindl. Vern. *Soh-lar-maw*, *Dieng-soh-lar-maw*, *Dieng-ngiang-risiong*, *Dieng-lar-maw*, Kh.

A small or moderate sized branchy tree attaining about 50 ft. in height, all parts glabrous. *Bark* dark-brown or grey rough, thin; blaze yellowish, turning brown. *Leaves* 1.5-4.25 by .7-1.2 in., oblanceolate or obovate, shortly blunt acuminate, quite entire, margins slightly recurved, thinly

coriaceous, glabrous, secondary nerves fine, about 6-9 on each half, mixed with intermediate minor nerves; base narrowed, sometimes cuneate, tapering to the petiole; petiole .4-.7 in. long; channelled, swollen at the base; stipules minute, subulate with a broad base. *Flowers* white, .15 in. across, in spreading corymbs. *Sepals* minute, lobes triangular, persistent; styles glabrous. *Drupe* globose, .15 in. across, blackish-brown when ripe.

KHASI & JAINTIA HILLS above 3000 ft.

As in the last species the old leaves turn coppery and then bright red before falling.

Flrs. 3? Fr. 2.

Fruit like galls are sometimes formed from the young ovary by insects which are larger than ordinary fruits.

13. POURTHIÆA Dcne.

Pourthiæa arguta Dcne. Vern. *Dieng-snam-dieng-um*, *Dieng-soh-dikhiew*, *Dieng-tyrkhim*, Kh.; *Dieng-soh-ryng-kham-um*, *Dieng-soh-pho-blai*, Synt.

A very variable erect shrub or small tree; bark grey to almost black, somewhat rough; blaze yellowish light-red or light-brown, turning yellowish brown, twigs often closely lenticellate; young parts and inflorescence at first woolly, glabrescent with age. *Leaves* 1.5-5.5 by .6-1.8 in., simple, lanceolate, oblong to elliptic-lanceolate, acuminate or sometimes acute, finely serrate or serrulate; lateral nerves 7-10, in some forms up to 12, on either half, impressed above, curved; base cuneate or acute; petiole .15-.4 in. long, glabrous or ultimately glabrescent; stipules minute, subulate. *Inflorescence* terminal, very rarely axillary, lenticellate. *Flowers* white, .25-.3 in. across, in few flowered dense corymbs or few together on the dense or lax corymbosely arranged branches of the inflorescence, the latter up to 1 in. long; pedicels up to .3 in. long; bracts and bracteoles setaceous. *Calyx tube* broadly obconic, densely or thinly woolly outside, lobes 5, triangular acute, as long as the tube, persistent in fruit, glabrous inside, except at the tips. *Petals* 5, contorted in bud, clawed, obovate or suborbicular, entire or notched, hairy or woolly within about the claw;

stamens about 20; filaments slender. *Ovary* 3 or 2 celled, nearly free and adnate to the calyx tube at the base, often only on one side, villous at the apex; ovules 2 in each cell, collateral, basal. *Styles* 3 or 2, connate half way or more up; stigma capitate, 2-fid. *Fruiting* corymb glabrous or glabrate, warty with lenticels. *Fruit* .25-.3 in. across, globose or obovoid-globose, 1-2 seeded with granular pulp; endocarp membranous. *Seeds* usually 1-2, plano-convex; testa coriaceous, closely marked on the convex side.

KHASI HILLS 2500-6500 ft.

According to Hooker the claw of the petals is glabrous, but in the large number of specimens examined by me I have found them always more or less hairy.

The timber is reddish-brown, seasons well and takes a fine polish; medullary rays fine, pores larger than in *Pyrus*. It should prove suitable for cabinet work if it could be obtained in sufficiently large size.

Flrs. 4. Fr. 12-1.

The following forms may be separated :—

1. **Var. *Wallichii*** F. B. I. Syn. *P. arguta* Dcne.—*Leave* 1.5-5 by .6-1.3 in., quite glabrous with age, coriaceous; pedicels stout, rugose with raised lenticels; fruit .25 in. across.

Commonest form, 3000-5500 ft.

2. **Var. *Hookeri*** F. B. I. Syn. *P. Hookeri* Dcne.—*Leaves* 3.5-5 in. long, oblong-lanceolate, acuminate, sometimes caudate; petiole long, up to .4 in.; corymbs lax; pedicels more slender than in var. *Wallichii*. *Fruit* .3 in. across, globose.

Mynso—2500 ft., Umpani 3500 ft. (KHASI HILLS.)

3. **Var. *latifolia***. *Leaves* 2.7-5 by 1-2 in., elliptic to oblong lanceolate, acuminate or caudate, midrib more or less persistently woolly; lateral nerves up to 12; petiole short. *Corymb* branches spreading, subumbellately collected on the axis, soon glabrescent. *Calyx* thinly woolly at the time flowers open, glabrate later on. *Fruit* ovoid-globose, up to .35 by .3 in.

KHASI HILLS 5000-6000 ft., e.g. Chang-chong forest, etc.

4. **Var. *membranacea*** Hk. f. *Leaves* oblong to ovate lanceolate, sharply acuminate, sharply serrate. *Inflorescence* very woolly. *Corymb* branches lax.

Surarim, etc. (KHASI HILLS.)

5. **Var. *Parvifolia*.**—*Leaves* 1·5-2·5 in. long, narrow lanceolate, coriaceous, acuminate. *Corymbs* contracted, fruit $\frac{1}{4}$ in., rather ovoid.

KHASI HILLS—Jowai—C. B. Clarke.

***Pourthiæa salicifolia* Dcne.** *P. arguta* Dcne. *Var. salicifolia* Hk. f. Vern. *Dieng-soh-dikhiu*, Kh.

A large shrub; young shoots, petiole, midrib of leaves and inflorescence subpersistently flocculent, tomentose. *Leaves* 2·5 by ·6-1 in., narrow-lanceolate, oblanceolate or oblong lanceolate, finely acuminate, finely cuspidate serrate; base attenuate-cuneate, subcoriaceous, glabrous or glabrate with age above, more or less floccose beneath, specially along the midrib; lateral nerves 10 on either side, arcuate, prominent beneath, nervules much more laxly reticulate between than in the last species; petiole ·15-3 in. long. *Flowers* creamy white, ·25-·3 in. across, either few together (often 3) at the ends of the lax branches of a corymb or on simple corymbs; flower buds almost hidden in cotton. *Calyx* hoary with matted hairs, lobes woolly within at the apex only. *Petals* suborbicular, woolly inside about the claw; styles and ovary as *P. arguta*. *Fruit* obovoid, globose, about ·2-·25 in. long on lenticellate pedicels.

Rongengiri—GARO HILLS.

This form is so markedly different that it seems best to separate it.

14. COTONEASTER Linn.

***Cotoneaster Simonsii* Baker.** Vern. *Dieng-jik-rai*. Kh.

A rigid shrub attaining 8 ft. in height; young parts densely pubescent or villous. *Leaves* subdistichous, ·5-·9 in. long, rhombic-orbicular to ovate, abruptly short acute or acuminate, mucronate, entire, margins subrecurved, subcoriaceous, at first thinly pubescent with long adpressed hairs on both surfaces, sparsely pubescent or glabrous with age except along the midrib; lateral nerves 4-5, very slender, arched; petiole ·1-·15 in. long, adpressed pubescent; stipules subulate from a broad base up to ·25 in. long. *Flowers* not seen. *Fruit* subsessile or shortly pedicellate, solitary or in pairs on the leaf axils, bright scarlet and glabrous when ripe, oblong turbinate, crowned with the incurved calyx lobes with 2-3, bony, 1-seeded stones.

Laitlyngkot—KHASI HILLS.

Fr. 11.

FAM. 52. SAXIFRAGACEÆ.

Trees, shrubs or herbs. *Leaves* alternate; stipules 0, or the stipules adnate to the base of the petiole or opposite and exstipulate. *Flowers* hermaphrodite or polygamodiceous, regular, usually 5, sometimes 4 merous. *Calyx* more or less adnate to the ovary, sometimes quite free; lobes imbricate or valvate. *Petals* rarely 0, perigynous or epigynous, rarely subhypogynous, imbricate or valvate. *Stamens* inserted with the petals, equalling or double the number, rarely numerous. *Disk* cup-like or sometimes reduced to intrastaminal glands. *Ovary* of 2 or 3-5 carpels, usually 2 or 3-celled with axile placentas, sometimes 1-celled with parietal placentas; styles as many as the carpels, free or combined nearly to the top; stigmas capitate or lateral and subcapitate; ovules numerous, erect or pendulous. *Fruit* capsular or baccate. *Seeds* numerous or few, rarely solitary, usually albuminous.

I. Shrubs or trees :—

A. Leaves opposite or subopposite :—

1. Stamens 8-12. Seeds many :—

a. Styles 2-4 :—

Calyx segments of sterile
flowers much enlarged in fruit;

fruit capsular, dry.

1. Hydrangea.

All flowers fertile; fruit

baccate, intensely blue.

2. Dichroa.

b. Style 1; petals falling off in a cap.

3. Pileostegia.

2. Stamens 4, seeds 1.

4. Polyosma.

3. Stamens 20-40.

Philadelphus.

B. Leaves alternate :—

Ovary nearly free of 2 carpels,
almost wholly superior :—

Fruit a capsule. No basal nerve. **5. Itea.**

Ovary inferior :—

Fruit a berry; leaf base 3-5
nerved.

6. Ribes.

Herbs with perennial rootstocks :—

Ovary of two carpels :—

Leaves simple.	..	..	Saxifraga.
Leaves pinnate.	..	..	Astilbe.

1. HYDRANGEA Linn.

Hydrangea vestita Wall. Vern. *Siw-pakha* or *Pakha-khalaw*, *Dieng-lap-masi* (bullock's kidney), *Dieng-jariet-iong*, Kh.

A small crooked deciduous tree or a large shrub. *Bark* greyish, exfoliating in thin flakes, soft and corky; blaze greenish-white, smooth; young parts and inflorescence rather rough with papillose hairs with persistent bases, the latter ultimately forming raised dots; branchlets stout with a large pith. *Leaves* 4·5-9 by 2·5-5 in., broadly ovate or elliptic to suborbicular, acute or obtuse, unequally dentate, subcoriaceous, thinly hairy or glabrescent above, tersellated and thinly clothed with white papillose hairs beneath; petiole ·8-2 in. long, channelled with subamplexicaul bases. *Flowers* greenish-white, about ·2 in. across, outer sterile, in many flowered-flat-topped terminal, corymbose panicles, lower branches from upper leaf axils; lower bracts leafy, upper gradually smaller, ultimately spathulate, subulate or setaceous; bracteoles resembling the upper bracts; pedicels about ·05 in. long, hairy. *Calyx* adnate to the ovary, glabrous; lobes 5, about equalling the tube or slightly longer, ovate—acute, those of the sterile flowers sub-petaloid, greenish, ovate—elliptic, elliptic or orbicular, entire, veinose, thin, usually 3-4 developing, ·4-·8 in. long. *Petals* valvate, expanding, (not falling off in a piece), about ·1 in. long, exceeding the calyx lobes, oblong. *Stamens* 10. *Ovary* somewhat imperfectly 3 celled; ovules many, axile at the ends of the partitions; styles 3, persistent. *Capsule* crowned by a conical cap formed by the styles and opening by an aperture at their base; seeds minute; testa hyaline, tailed at either end.

KHASI HILLS 5-6000 ft., on shady banks of streams.

Hydrangea robusta Hk. f. & T. Var. *Griffithii* C. B. Clarke?

A large shrub or a small tree; young parts pubescent. *Leaves* 4·5-9 by 3-5 in., ovate or elliptic, acuminate, serrate-dentate; base rounded or in upper leaves narrowed to the petiole; lateral nerves about 8 on either half, arcuate, with few scattered hairs above thinly

hirsute on the nerves beneath, (undersurface not tersellated); petiole 1·2-2 in., channelled, upper margined. *Flowers* blue; panicles spreading, corymbose. *Sepals* of sterile flowers 1·1-5 in., elliptic or elliptic obovate, narrowed to a very short stalk at the base, serrate or coarsely few toothed. *Calyx* teeth of fertile flowers, minute. *Styles* 2. *Capsule* subhemispheric, broader than long, slightly compressed, ribbed.

Mishmi Hills near Dilai.

Fr. 10.

Hydrangea hortensia Sieb.—A large very spreading shrub. *Leaves* about elliptic-acuminate, serrate, dark green, glabrous, except along nerve axils. *Flowers* in large compact head-like compound cymes, all sterile, blue, turning pink.

Largely grown in Shillong in gardens.

2. DICHROA Lour.

Dichroa febrifuga Lour. Vern. *Kaliangeri*, *Ban-suk*, Nep.

An erect shrub 5-8 ft. in height; stems grey with large pith; young shoots and inflorescence pubescent with short curled hairs. *Leaves* opposite, 3·5-8 in. by 1·2-3 in., lanceolate or oblanceolate, acuminate, dentate, tapering at the base to the petiole, chartaceous, thinly pubescent along the nerves on both surfaces and with few scattered hairs above between the nerves; lateral nerves 7-9 on either half, arcuate; petiole usually ·5-1·5 in., sometimes up to 2 in. long, channelled, dilated at the base. *Flowers* blue, ·3 in. across in terminal panicles of cymes; pedicels slender, ·2-·4 in. long. *Calyx* tube adnate to the ovary, thinly hairy; limb 5-6 toothed. *Petals* valvate, 5-6, expanding, oblong, thick, about ·3 in. long. *Stamens* 10 or 12, epigynous; anthers clavate, blue. *Ovary* $\frac{3}{4}$ inferior, 1-celled; styles 3-5; stigmas blue, resembling the anthers; ovules numerous on 3-5 parietal placentas. *Berry* ·2 in. across, globose, deep blue when ripe, crowned by the persistent calyx lobes, 3-5 styles in the centre; seeds numerous, small; testa with large reticulations.

KHASI HILLS 4500-6000 ft.

The Nepalese use as a decoction from the shoots and bark of the roots as a febrifuge often in sufficient quantities to make them sick which not improbably aids indirectly in curing. It appears to have no active effect in ordinary doses.

Flrs. 7-8. Fr. 11-12.

3. **PILEOSTEGIA** Hk. f. & T.**Pileostegia viburnoides** Hk. f. & T.

An evergreen shrub or small tree attaining about 25 ft. in height, with rather stout decussate branches. *Leaves* decussate, 3-6 by 1-2 in., obovate or elliptic, oblong, acute or acuminate, gradually narrowed to the base, entire or sometimes serrulate, coriaceous, glabrous; lateral nerves 6-8 on either side, oblique, arched; petiole .3-.5 in. long, channelled and flattened. *Cymes* in terminal panicles, which are 5-6 by 4-5 in. with decussate branches. *Flowers* .2 in. across; calyx teeth very broadly triangular; petals imbricate, white, obovate, connate at the base and falling off as a cap; stamens 5, 8 or 10; filaments .2-.35 in. long. *Ovary* inferior, 4-6 celled with numerous ovules; style thick with a pyramid at the apex, the 4-6 angles of which are stigmatic; ovules numerous, pendulous. *Fruit* ovoid, .3 in. long, capsular.

4. **POLYOSMA** Blume.**Polyosma integrifolia** Blume.

A middle sized evergreen tree; young shoots tawny pubescent; twigs lenticellate; branchlets lenticellate. *Leaves* nearly opposite, 3-8 in. long, lanceolate or oblanceolate, acuminate, entire or distantly toothed, cuneate at the base, more or less pubescent on the nerves, more persistently beneath; petiole .5-1 in. long, pubescent. *Flowers* greenish-white, tetramerous in terminal pubescent racemes; pedicels very short; bracteoles 3, small, subulate; buds densely pubescent, cylindrical, .3-.5 in. long. *Calyx tube* adnate to the ovary; lobes small, persistent, deltoid. *Petals* valvate, linear, often cohering, hairy within. *Stamens* 4, epigynous; filaments thick, hairy. *Ovary* inferior, 1-celled; ovules numerous on two parietal placentæ, which intrude considerably in the cells. *Fruit* sub-baccate, .3-.5 in. long, smooth, ellipsoid, 1-seeded. *Seed* ascending with fleshy albumen and small embryo.

KHASI HILLS 3,000-4,000 ft. *De Silva, Hooker*, ASSAM—Griffith.

Flrs. 5, rainy season (Brandis).

Var. typica C. B. Clarke.—Leaves entire.

Var. Wallichii C. B. Clarke.—Leaves denticulate.

KHASI HILLS—Mann.

Philadelphus coronarius Linn.

A shrub with grey stems. *Leaves* opposite, 2·3-75 in. long, ovate-lanceolate, acuminate, distantly minute-toothed, thin, dark-green and glabrous above, paler and pubescent along the nerves or glabrescent beneath, strongest pair of lateral nerves sub-basal; petiole about ·2-·3 in. long. *Flowers* tetramerous, white, up to 1 in. across, fragrant, usually 3 terminal and 1-2 pairs from upper leaf axils; pedicels up to ·3 in. long. *Calyx* glabrous outside, tomentose at the apex within. *Petals* obovate. *Stamens* 20-40; filaments subulate. *Ovary* inferior; styles 3-4, united for about third their length.

Sometimes grown at Shillong for the flowers.

Flrs. 5.

5. ITEA Linn.

Shrubs or trees. *Leaves* alternate, glabrous, dentate or crenate. *Flowers* pentamerous, small, white, in many flowered terminal and axillary racemes. *Calyx tube* short, adnate to the base of the ovary; petals valvate. *Stamens* 5, perigynous. *Ovary* nearly superior, 2-celled; style short, simple; ovules many, axile. *Capsule* nearly free, conical or elongate; base only adnate to the persistent calyx, dehiscent through the styles and the dissepiments. *Seeds* elongate, with loose testa, which is more or less produced at their end.

Leaves usually large; petals recurved to the pedicel, never persistent in fruit; ovary glabrous.

1. *I. macrophylla*.

Leaves small to medium sized; petals erect, persistent in fruit; ovary pilose.

2. *I. chinensis*.

1. Itea macrophylla Wall. Vern. *Dieng-soh-tartet-shang-um*, *Dieng-la-met-heh*, *Dieng-lieh*, *Dieng-la-myllon*, Kh.; *Dieng-saru*, Synt.; *Phui-thing*, Lushai.

A small tree or large shrub. *Bark* greyish or brown to almost black with vertical fissures; blaze light red. *Leaves* 4·5-9 by 2·4·5 in., elliptic, elliptic-oblong or broad ovate, shortly acuminate, glandular-serrate, rounded to subacute at the base, glabrous, coriaceous; lateral nerves 8-12 on either half, tertiaries fine, subparallel; petiole stout, ·5-1 in. long, stout, glabrous. *Racemes* 1-5 from upper leaf axils up to 8 in. long, pubescent when young, later on puberulous. *Flowers* white, ·2 in. across; bracts subulate, up to ·1 in. long, caducous; pedicels ·05 in. long. *Calyx tube* puberulous,

obconic; teeth acute. *Petals* .1 in. long, oblong-lanceolate, closely reflexed on the pedicel between the calyx lobes. *Disk* intrastaminal, prominent, glabrous. *Ovary* glabrous. *Capsule* tapering to the style, .25-.4 in. long; base of the carpels usually sunk in the calyx tube; stigmas often cohering long after the splitting of the style; calyx teeth often ultimately weaving off.

KHASI HILLS 2-5,000 ft., LUSHAI HILLS (Tepaimukh), NORTH CACHAR HILLS (near Mahur), KAMRUP—Barduar Reserve.

Flrs. 4-6. Fr. 11-2.

2. *Itea chinensis* Hook and Arn. Vern. *Dieng-la-met-rit*, *Dieng-soh-tyrtet-nong-shang*, *Dieng-niarli*, *Dieng-tem-sro*, Khasi.

A small tree (a shrub according to C. B. Clarke) with grey to almost black rough bark; blaze yellowish, turning brown. *Leaves* 2-4.5 by .7-2.2 in., elliptic, oblong, obovate or oblanceolate, usually shortly acuminate, distantly glandular, serrulate, acuminate, often abruptly cuneate at the base, glabrous, subcoriaceous; lateral nerves 5-8 on either side, tertiaries subparallel; petiole channelled, .3-.5 in. long. *Flowers* white, about .15 in. across, yellowish white. *Racemes* 1-3 together on leaf axils, 1.2-2.5 in. long, puberulous; bracts up to .15 in. long, subulate, often with 1 or 2 linear lobes; pedicels up to .1 in. long. *Calyx tube* puberulous; teeth acute. *Petals* .1 in. long, erect in flower, lanceolate, persistent and often adpressed to the fruit. *Disk* thin, like the ovary, pilose. *Capsule* .3-.4 in. long, tapering, scarcely sunk in the calyx tube; calyx teeth persisting.

KHASI & JAINTIA HILLS—2,500-5,500 ft.

Flrs. 4-5. Fr. 10.

6. RIBES Linn.

Shrubs, usually unarmed, sometimes prickly. *Leaves* alternate, simple, usually lobed, exstipulate. *Flowers* 1-2 sexual in racemes, solitary or clustered. *Calyx* 4-5 merous, superior; tube often produced beyond the ovary. *Petals* 4-5, inserted at the mouth of the calyx tube. *Stamens* 4-5. *Ovary* inferior, 1-celled; styles 2, free or connate; ovules numerous,

on 2 parietal placentas. *Fruit* ovoid or globose, crowned by the marcescent calyx.

Unarmed :—

Flowers unisexual (polygamo-diœcious,
Parker) :—

Racemes 1-3 in. long, erect in
flowers, drooping in fruit. .. 1. *R. glaciale*.

Flowers bisexual :—

Racemes 3-8 in. long, pendent. .. 2. *R. Griffithii*.

1. *Ribes glaciale* Wall.

An erect shrub 5-8 ft. in height; stem shining, glabrous. *Leaves* 1-3 by 1-1·5 in., 3-5 lobed (not lobed Dr. N. L. Bor), ovate; lobes sharply inciso-serrate, acute or acuminate, membranous, glabrous or with scattered hairs above, pubescent along the nerves beneath; lateral nerves 2-4 on either half; base 3-5 nerved, cordate or occasionally truncate; petiole slender, ·5-1·5 in. long. *Racemes* pubescent, erect and glandular, 1·5-3 in. long. *Flowers* about ·15-·2 in. across, greenish (drying brownish or reddish); bracts ·2-·25 in. long, longer than the pedicels. *Calyx* minutely pubescent; petals minute, clawed; limb obtuse; stamens exceeding the petals; style bifid. *Berries* acid, ·2-·25 in. across, smooth, glabrous.

MANIPUR (Watt No. 6587). NAGA HILLS (Sibpur No. 11420), AKA HILLS, PIRI MOUNTAIN—BALIPARA FRONTIER TRACT (Dr. N. L. Bor No. 774 & 788), (800-1,000 ft.).

Flrs. 5-6. Fr. 7-8.

2. *Ribes Griffithii* Hk. f. & T.

A shrub or a small tree. *Leaves* 2-3·5 in. long, often as broad, 4-5 lobed (lobes acuminate inciso-serrate), membranous, pubescent on the nerves beneath; base 5 nerved, cordate; petiole 2-3·5 in. long. *Racemes* 3-8 in. long, lax, pendent. *Flowers* ·15 in. across; pedicels about ·07 in. long; bracts linear, lanceolate, exceeding the pedicels. *Calyx* campanulate, produced beyond the ovary. *Berries* ovoid or ellipsoid, ·2-·4 in. long, red.

AKA HILLS, PIRI MOUNTAIN, (BALIPARA FRONTIER TRACT), (Dr. N. L. Bor No. 793), (8,500 ft.).

Flrs. 6. Fr. 8.

Saxifraga ligulata Wall. Vern. *Jajaw-maw-ramsang*, Khasi.

A herb with a stout perennial creeping rootstock. *Leaves* simple, very variable in size, usually 6-12 in. long, orbicular to broadly obovate, fleshy, strongly ciliate, often pinkish beneath, glabrous, dotted beneath; petiole with a large sheath at the base. *Flowers* white or pink, waxy, .6-.8 in. across in corymbose scapes. *Calyx* persistent, adnate to the ovary at the base only; lobes 5, erect in fruit. *Stamens* 10, perigynous. *Petals* clawed. *Carpels* 2, united below; styles free, long; ovules numerous. *Ripe* carpels opening at the top on the ventral side.

KHASI HILLS—4,000-5,500 ft., not common, on rocks in cool shady situations.

Flrs. 3-4.

Astilbe rubra Hk. f. & T.

An erect hairy herb up to about 3 ft. high with a perennial creeping rootstock; stem and leaf rachis with long reddish-brown hairs specially at the nodes of the leaf and pinnæ. *Leaves* alternate, 6-12 in. in length, 2-3 pinnate; pinnæ ternate, often with ternate leaves; pinnules towards the base; stipules adnate to the base of the common petiole, sheathing with membranous edges. *Leaflets* 1-2 in. long, ovate or terminal, sometimes rhomboid, acuminate or acute, coarsely biserrate, sometimes lobed; base subcordate or rounded to cuneate with rough hairs on both surfaces. *Flowers* small, about .2 in. long, pink, in long woolly pubescent terminal panicles of spicate racemes. *Calyx* 5 lobed, adnate to the base of the ovary, green at the base; teeth pink, erect. *Petals* 5, perigynous, narrowly strap-shaped, much exceeding the calyx lobes. *Stamens* 10. *Carpels* 2, united below for a great portion narrowed to the short style; ovules numerous. *Ripe* carpels dehiscing ventrally.

KHASI HILLS, 4,000-6,000 ft.

Flrs. 7.

Astilbe rivularis Ham.

An erect herb attaining up to 4 ft. in height; stem and leaf with long reddish hairs. *Leaves* 10-21 in. long, ternately imparipinnate as in the last species with similar stipules. *Leaflets* 1-4 in. long, ovate or elliptic, terminal, sometimes obovate or rhomboid, acuminate, often caudate (in our area), biserrate, sometimes lobed, thinly coriaceous, rough on both surfaces; base cordate, rounded or cuneate, sometimes unequal. *Flowers* greenish-yellow, very small in woolly pubescent terminal panicles. *Calyx* 5 lobed, adnate to the base of the ovary. *Petals* 0. *Stamens* 5. *Carpels* 2, slightly united.

KHASI HILLS, 5-6,000 ft.

Flrs. 7-9.

FAM. 53. DROSERACEÆ.

Perennial glandular hairy herbs, insectivorous. *Leaves* radical or cauline; stipules 0, represented by hairs edging the dilated base of the petiole. *Inflorescence* various. *Flowers* regular, hermaphrodite. *Calyx* 4-5 (8) partite or free, imbricate, persistent. *Petals* as many as the sepals, hypogynous or nearly so, marcescent, imbricate in bud. *Stamens* as many as the petals, hypogynous or nearly so; filaments free or connate at the base. *Ovary* nearly free, globose or ovoid, 1-3 locular; style 3-5; stigma 2-fid or fimbriate; ovules numerous, usually on parietal placenta, anatropous. *Capsule* membranous, 3-5-valved. *Seeds* numerous, albumen fleshy; embryo minute.

DROSERA Linn.

Perennial herbs, scapigerous, glandular—hairy. *Leaves* often rosulate, usually circinate in veneration. *Flowers* white or rosy. *Calyx* 4-8-partite, free from the ovary, imbricate. *Petals* 4-8, hypogynous or nearly so, marcescent. *Stamens* as many as the petals. *Ovary* free, 1-celled, placenta parietal; styles 2-5. *Capsule* loculicidally 2-5-valved. *Seeds* ovoid-ellipsoid; testa black, smooth, reticulate .

Leaves radical, rosulate, spatulate; styles 5, undivided.	.. .. . 1. <i>D. Burmanni.</i>
Leaves cauline, alternate, semiterminate, peltate; styles 3, fimbriate.	.. .. . 2. <i>D. peltata.</i>

1. *Drosera Burmanni* Vahl.

Stem scarcely any. *Leaves* .2-.6 by .16-.3 in., tinged with red, all radical—rosulate, spatulate, clothed with curious gland-tipped tentacles; petioles flat; stipules scarious, scape 2-8 in. long, erect, rachis purplish, glabrous; pedicels slender. *Calyx* papillose, segments linear-oblong, obtuse. *Petals* white, spatulate; styles 5, undivided. *Capsule* 5-valved. *Seeds* numerous, minute, black, reticulate.

KHASI HILLS, SYLHET and GARO HILLS.

Flrs. 1-2.

2. *Drosera peltata* Sm. in Willd.

An erect herb. *Stem* erect, 3-12 in. high, leafy. *Leaves* alternate, peltate, with upturned cusps. *Racemes* subterminal, 2-6 in. long. *Flowers* white; pedicels slender, .2-.5 in. long. *Sepals* ovate, glabrous, erose or fimbriate. *Seed* similar to *D. Burmanni*.

KHASI HILLS 3-5,500 ft.

Flrs. 5-6.

FAM. 54. HAMAMELIDACEÆ.

Trees or shrubs often with stellate or fasciculate hairs. *Leaves* alternate, simple or palmately lobed; stipules 1-2, rarely wanting, usually deciduous. *Flowers* hermaphrodite or unisexual, collected into compact heads or spikes or close racemes, usually bracteate. *Calyx tube* adnate to the ovary, rarely free (Distylium), lobes small or 0. *Petals* 4-5 or 0, perigynous or nearly epigynous. *Stamens* 4-numerous, perigynous, rarely hypogynous (Distylium). *Ovary* 2-celled; styles 2, ultimately divaricate, persistent (deciduous in Altingia); ovules 1 to many, axile, pendulous. *Capsule* woody, dehiscing loculicidally at the apex and often also septicidally, endocarp often horny and separating from the exocarp. *Seeds* 1 or many when usually the lowest in cell is perfect, testa shining, endosperm usually thin.

All Indian genera of this family have bordered pits on the walls of wood prosenchyma like the conifers.

I. Ovules solitary in each cell of ovary :—

A. Petals 0 :—

Ovary superior. . .	..	..	1. Distylium.
Ovary half inferior.	..	..	2. Sycopsis.

B. Petals 4-5 :—

Calyx tube adnate to the ovary :—

Leaves hazel-like, toothed. Flowers in spike-like racemes. Petals

obovate-oblong under .3 in. .. 3. *Corylopsis*.

Leaves entire. Flowers in heads.

petals linear, .4-.6 in. long, much exceeding the calyx. .. 4. *Loropetalum*.

II. Ovules many in each cell of ovary :—

Leaves serrate. Petals 0 in both male and female flowers; stipules small, subulate; styles deciduous. .. 5. *Altingia*.Leaves entire. Petals present in hermaphrodite flowers; stipules large, persistent. .. 6. *Bucklandia*.1. *DISTYLIUM* Sieb & Zucc.*Distylium indicum* Benth.

A small tree, ends of twigs rusty pubescent. *Leaves* 2.5-4 by 1-1.5 in., obovate or elliptic, tip rounded or gradually or abruptly acuminate, entire, coriaceous, glabrous (more or less stellate pubescent—*F. B. I.*); lateral nerves about 6 on either half, very faint above, the first pair subbasal and very oblique; base cuneate; petiole .2-.3 in. long, margined; stipules lanceolate, pubescent. *Racemes* axillary, upright, 1.5-2 in. long. *Flowers* polygamous. *Calyx* free, early deciduous; pedicels .3-.5 in. long (*F.B.I.*). *Stamens* hypogynous; styles 2, very long. *Fruit* immature, about .6 in. long, erect, covered with stellate pubescence.

KHASI HILLS—Griffith—rare.

The above description has been based on a somewhat incomplete sheet (Griffiths 3397) at Calcutta Herbarium.

2. *SYCOPSIS* Oliv.*Sycopsis Griffithiana* Oliv.

A small tree with lenticellate branches; young parts and inflorescence clothed with minutely stellate pubescence. *Leaves* alternate, 2-4 in. by .8-1.6 in., lanceolate, acuminate; base narrowed to the petiole, coriaceous, thinly stellate pubescent along the nerves beneath, soon becoming glabrous or nearly so; lateral nerves rather indistinct, about 7-10 on either side, meeting in loops; petiole thinly stellate—pubescent

or glabrate; stipules about .2 in. long, linear-lanceolate, early deciduous. *Flowers* unisexual in short dense axillary spikes, both sexes in the same spike. *Male* calyx very small; petals 0. *Stamens* 8 (of which number several appear abortive); rudimentary ovary 2-fid—*F.B.I.* *Female flowers*: calyx irregularly 5-lobed; lower portion of calyx tube adnate to the ovary, free portion pubescent within. *Petals* 0. Ovary 2-celled; styles 2, free; ovule solitary in each cell, pendulous. *Fruits* about .5 in. long, globose or ellipsoid with a hard endocarp more or less rugose and with stellate tomentose outside.

KHASI & JAINTIA HILLS—4000 ft., Cherrapunji, rare.

Fr. 6-8.

3. CORYLOPSIS Sieb & Zucc.

Corylopsis himalayana Griff. Vern. *Tiew-lang-lieh*, *Dieng-piur*, *Dieng-la-paiur*, Kh.

A large deciduous shrub or small tree with nearly smooth, grey or nearly white bark; young shoots, inflorescence and petioles silky villous with stellately fasciculate hairs. *Leaves* plicate in bud, 2.5-5 by 1.5-3.2 in., broadly ovate or ovate-oblong to orbicular, often oblique, acute or shortly acuminate; margin with excurrent hairy teeth, subcoriaceous, glabrous above, paler and fasciculate pubescent specially on the nerves beneath; lateral nerves 9-12 on either side, lowest 2 pairs from near the base, straight, sub-parallel, upper unbranched. lower always branching outwards; base more or less cordate, petiole .4-1.5 in. long; stipules lanceolate-membranous, .6-1 in. long, adpressed silky within, deciduous. *Flowers* bisexual, pentamerous, about .3 in. across, pale-yellow in drooping catkin like spikes, 1-2 in. long, which when young are enclosed within membranous, elliptic-acute or lanceolate scales, .5-7 in. long, resembling the stipules, each flower subtended by a villous concave bract up to .2 in. long. *Calyx tube* adnate to the ovary, hairy, ribbed in fruit, lobes acute, deciduous. *Petals* obovate-oblong, or obovate-spathulate, clawed, .2-.25 in. long. *Stamens* 5, with a number of reddish scale like staminodes; anthers separated by broad connectives. *Ovary* free at the top, 2-celled; styles

2, soon divaricate; ovule 1 in each cell, pendulous. *Capsule* woody, about .25 in. across, endocarp separating from the horny endocarp. *Seeds* with black testa.

KHASI HILLS, 5,000- about 6,500 ft.

The flowers are eaten by the Khasis cooked as vegetable.

Flrs. 1-3. Fr. 6.

Corylopsis manipurensis Hemsl. in Hooker's *Icones Plantarum*.

A shrub. *Leaves* appearing with the flowers, (immature only seen) 1.8-2.5 in. long, obovate, acuminate, glabrous or soon glabrescent above, pilose with long hairs on the nerves beneath; petioles slender, .2-.4 in. long; stipules .6-.8 in. long, glabrous outside, sericiopilose within. *Racemes* terminating branches, 1.7-2.25 in. long, pilose; bracts and bracteoles densely silky hairy on both surfaces. *Petals* oblanceolate, .3-.4 in. long, clawed, much exceeding the calyx and stamens; scales 10.

MANIPUR—Watt!

Flowers 4.

Differs from *C. himalayana* by its leaves appearing with the flowers, solitary petal.

4. LOROPETALUM Br.

Loropetalum chinense Oliv. Vern. *Dieng-jala-um*, Kh.

A large evergreen shrub or small tree; bark grey, thin; branchlets and inflorescence densely stellate pubescent. *Leaves* alternate, 1-2.5 in. by .7-1 in., lanceolate to elliptic or obovate acute or acuminate, subentire or minutely toothed, glabrous above, paler and stellate pubescent, more densely on the nerves beneath; lateral nerves 5-7; petiole .1-.2 in. long, soon deciduous. *Flowers* small, greenish white, bisexual, tetramerous, sessile, 6-8 together in heads, which when fully expanded are about 1 in. across. *Heads* terminal or axillary or in short racemes of 2-3; peduncles about .2 in. long. *Calyx* .1 in. long, tube adnate to the ovary, tomentose, lobes longer than the tube, valvate, up to about .15 in. long. *Petals* .4-.6 in. long, linear, much exserted, white. *Stamens* 4, perigynous; filaments very short, connective produced into a horn from the anthers, short, edges of the valves bending and adhering to the connective. *Ovary* half inferior, 2-celled; styles 2, soon divaricate; ovule 1 in each cell. *Capsules*

1-4 per head, subsessile, .3-.4 in. long, rusty, stellate-tomentose, obovoid.

KHASI HILLS, 4-5000 ft. rare, Nongkhlaw, Mawrykneng—Prain.

Flrs. 3-4.

5. ALTINGIA Noronha.

Altingia excelsa Noronha. Vern. *Duang*, *Jutuli*, Ass.; *Jikri*, Mik.; *Yogir-asing*, Miri; *Siri-asing*, Abor; *Sangri-changne*, Duff.

A very tall aromatic tree attaining a girth of over 17 ft. in favourable situations. *Bark* light to dark grey or brown, exfoliating in large flakes; blaze brown; youngest shoots pubescent, soon becoming glabrous; branches with large lenticels. *Leaves* 3-6.5 by 1.3-2.5 in., lanceolate, elliptic or ovate, caudate or sharply acuminate, serrate; base rounded or narrowed, glabrous, but usually with tufts of hair on the nerve axils; lateral nerves 7-10 on either half, meeting in loops near the margin; petiole .5-1.5 in. long, slender; stipules up to .3 in. long, adnate at the base, free end subulate, deciduous. *Flowers* unisexual in dense heads in short spikes or racemes, supported by large silky bracts, each consisting of a fleshy axis supporting a mass of closely packed anthers with very short filaments. *Female* heads on long peduncles, solitary, axillary at the ends of branches, many flowered. *Calyces* confluent, limb 0. *Petals* 0. *Ovary* free only at the top, 2-celled; styles 2, deciduous; ovules numerous, axile. *Fruit* head globose, rough, woody, about .5 in. across. *Capsules* brown, tomentose; seeds numerous, only 1-2 in each cell, fertile; fertile seeds winged.

UPPER ASSAM from N. E. FRONTIER to SIBSAGAR, sometimes gregarious, e.g., Charduar in DARRANG.

The wood is hard, cross grained. It is cut up into planks when green which is very good for indoor work when not in contact with moisture. The weight (Assam) is about 45 lbs. per c. ft.

The young leaves are red. It yields the resin known as "Storax," which is contained in canals, which accompany the vascular bundles to the last ramifications and in the stem run along the circumference of the pith—Brandis.

Flrs. rainy season. Fr. 2-5.

6. BUCKLANDIA Br.

Bucklandia populnea Br. Vern. *Dieng-doh*, *Dieng-myntat*, Kh.; *Dieng-soh-ryndoh*, Synt.

A medium-sized to tall handsome tree; bark grey or brown to almost black, rough, coarse fibred, hard; blaze reddish-brown with white lines. *Branchlets* green, glabrous. *Leaves* 4·5-7 by 3·5-8 in., broadly ovate to nearly orbicular, sharply acuminate, sometimes 3-cuspidate, specially in young plants, entire with a semitransparent cartilaginous margin, dark glossy green above, silky when very young, but soon glabrous on both surfaces or sometimes with few dark reddish, adpressed hairs, persisting on the nerves beneath, coriaceous; lateral nerves 3-4 (excluding basal); base truncate, subtruncate or retuse, 5-7 nerved; petiole 1-3 in. long, terete, stout; stipules ·7-1·5 in. by ·4-·75 in., coriaceous, somewhat obliquely obovate-oblong, often minutely punctate, concealing the silky buds, deciduous. *Inflorescence* of 2-5 peduncled heads on a very short axis, enclosed at first by the stipules, densely rusty pubescent, when young, nearly glabrate with age; peduncles ·6-1 in. long. *Flowers* polygamous, 8-20 in a head, more or less connate by their calyces. *Calyx tube* adnate to the ovary; limb of 5 lobes. *Petals* in the hermaphrodite flowers variable in number, linear—spathulate, rudimentary in the female flowers. *Stamens* 10-14, absent in female flrs.; filaments long. *Ovary* half inferior, 2-celled, exposed portion brown silky; styles 2, free, soon divaricate; ovules 6-8 in each cell. *Capsule* free, except at the base, woody, subglobose with horny endocarp, which has a tendency to separate from the exocarp; upper seeds in each cell not winged, sterile, lowest winged and fertile.

KHASI HILLS—5000-6000 ft.; common but nowhere plentiful.

Wood weighs about 45 lbs. per c. ft. (Gamble). It is reddish-brown, close grained, with very fine and close medullary rays. The timber is durable and is in considerable demand in the Darjeeling District for planking and door and window frames. It does not ordinarily grow to much size in our area. About 7000 seeds weigh 1 oz.

Flrs. & Fr. 11-12, but also at other times of the year.

FAM. 55. RHIZOPHORACEÆ.

Trees or shrubs, generally glabrous. *Leaves* opposite, entire, coriaceous; stipules interpetiolar, deciduous. *Flowers* regular, usually bisexual. *Calyx* more or less adnate to the ovary, less often free, 4-14 toothed or lobed, persistent. *Petals* as many as the calyx lobes, often 2 fid or lacinate; stamens usually twice as many as the petals, rarely indefinite; filaments free. *Ovary* 5-1 celled by disappearance of the septa; styles usually connate; ovules pendulous, usually 2 in each cell. *Fruit* coriaceous, usually 1-celled, 1-seeded.

CARALLIA Roxb.

Carallia lucida Roxb. Syn. *C. integerrima* DC. Vern. *Mahi-thekra*, *Kathal-boula*, *Daini-jam*, Ass.; *Thai-daukri-phang*, *Kala-jam*, *Oima-thepo-baphang*, Cach.; *Thengu-thung-arong*, *Thengbu-thung*, Mik.; *Theiril*, *Thei-lai-kol*, Kuki; *Saksimaring*, *Chok-chim-arong*, *Bol-neng-rang*, *Thekra-aga*, Garo; *Dieng-soh-lang-bali*, *Dieng-soh-syllih*, *Matam*, Kh.; *Matang*, Sylh.

A medium sized to small tree, often with branches of adventitious roots on the trunk; bark brownish, often with horizontal wrinkles, nearly smooth on old trees, light grey and corky on younger stems; blaze pale light or orange brown, turning dark brown on exposure. *Leaves* 3-7 by 1·3-3·2 in., elliptic or elliptic obovate, usually bluntly and rather abruptly short acuminate or sometimes obtuse, entire or serrulate near the apex, margins usually recurved, coriaceous, glabrous, shining, with dark dots on the undersurface; lateral nerves fine, 10-14 on either side, indistinct until dry with many intermediates, arching; petiole ·2-·4 in. long, stout, margined. *Flowers* sessile, creamy white, 6-8 merous, about ·2 in. across, in short peduncled compound trichotomous cymes; peduncles and pedicels stout. *Calyx tube* minutely bracteate at the base; limb 5-8 lobed; lobes erect, valvate. *Petals* 5-8, orbicular, erose, inserted on the calyx, on the

margin of a crenulated 10-16 lobed disk, which lines the latter. *Stamens* 10-16, inserted with the petals; filaments filiform. *Ovary* inferior. *Fruit* about .2 in. across, globose, 1-celled, 1 seeded.

Wood handsome, hard, red with broad prominent regular medullary rays with few fine short ones between, said to be good for furniture and cabinet making. 840-980 seeds weigh 1 oz.

Sometimes large depressed globose gall fruits about 1 in. across are formed. These become very succulent before dropping off and are then eaten. The epithet *Thekra* to the name may not inconveniently have arisen from mistaking this for a species of *Garcinia*.

Flrs. 12-2.

FAM. 56. COMBRETACEÆ.

Trees or shrubs, sometimes scandent. *Leaves* opposite, subopposite, less often quite alternate, extipulate, sometimes with peltate scales or dots beneath. *Flowers* generally small, bracteolate at the base, sometimes polygamous in spikes, heads or racemes, the latter often paniced. *Calyx tube* adnate to the ovary and often prolonged above it, sometimes to a great length, often broadened towards the end; lobes 4-5, valvate. *Petals* 4-5 or 0, inserted between the calyx lobes. *Stamens* 4-5 or twice the number. *Ovary* totally inferior, 1-celled; style simple; ovules few, pendulous from the apex of the cell. *Fruit* indehiscent, drupaceous or coriaceous, angled or commonly winged, sometimes crowned by an accrescent calyx. *Seed* 1; endosperm 0. *Cotyledons* often convolute.

I. Calyx limb deciduous :—

A. Trees, leaves alternate or subopposite.

Petals 0 :—

Flowers in spikes.	..	..	1. Terminalia.
Flowers in globose heads.	..	..	2. Anogeissus.

- B. Scandent or straggling shrubs; leaves opposite, petals as many as calyx lobes :—
 Flowers 4-5 merous; petals small, tube of calyx limb above the ovary not long. 3. *Combretum*.
 Flowers 5 merous; petals conspicuous, tube of calyx limb above the ovary, usually long and slender. .. 4. *Quisqualis*.
 II. Calyx limb accrescent in fruit :—
 Petals 0. Diffuse scandent shrub. 5. *Calycopteris*.
Illigera has been included under *Hernandiaceæ*.

1. TERMINALIA Linn.

Large trees. *Leaves* subopposite, opposite or alternate, sometimes crowded at the ends of branches, entire or slightly crenulate, often with glands at the base of the blade or on the petiole. *Flowers* small, hermaphrodite or sometimes the upper flowers of the spike male, greenish, in simple or paniced spikes; bracts narrow, caducous. *Calyx* tube constricted and produced above the ovary with a campanulate limb and 5 short lobes. *Petals* 0. *Stamens* 10, in two series, inserted on the calyx tube; filaments exerted; disk epigynous, hairy, lobed within the stamens. *Ovules* 2-3, pendulous. *Fruit* drupaceous or dry, smooth or angular or with 2-5 wings.

I. Fruits not winged :—

- A. Drupes tomentose globose; leaves clustered at the ends of branches. Spikes never paniced. 1. *T. belerica*.

- B. Drupes smooth not globose, leaves not clustered at the ends of branches. Spikes often paniced :—

Glands on the petioles not prominent, areoles between nervules of leaves not felted. 2. *T. Chebula*.

Glands on the petioles prominent, areoles between the nervules of leaves white with minute felt. .. 3. *T. citrina*.

II. Drupes winged :—

Deciduous; drupe large over 1.5 in. long with broad wings. 4. *T. tomentosa*.

Evergreen; drupe very small, scarcely .15 in. long with small wings. .. 5. *T. Myriocarpa*.

1. *Terminalia belerica* Roxb. Vern. *Bibhitaki*, *Bahe-ruka*, Sans.; *Bondoureja*; *Babraiphang*, Kach.; *Kuru*, Garu-

arong, Mik.; *Logio-asing*, Miri; *Bhamora*, Bowa, *Bhoira*, *Dubong*, *Silli*, Ass.; *Dieng rinyan*, *Dieng-soh-khoru*, *Dieng-soh-kong-khru*, Kh.; *Khung-khli-thing*, *Bakhalla*, Kuki; *Bakhla*, Tipp.; *Baura*, Mech; *Churi*, *Bol-churi*, *Bolsuiri*, *Bolbadok*, *Bol-chiroke*, Garo; *Bhengragota*, Jharua; *Barra*, Nep.; *Bahera*, Hind.; *Bohera*, Beng.

A large deciduous tree, sometimes buttressed at the base. *Bark* ashy dark-grey or brown, rough, exfoliating in irregular brownish small scales. *Blaze* pale yellow, turning brownish on exposure; young parts and inflorescence rusty tomentose. *Leaves* alternate, clustered at the ends of branches, 3-10 by 2-5 in., obovate to broadly elliptic, obtuse, subacute or apiculate at the apex, margin with a pellucid rim, coriaceous, puberulous when young, dark green and glabrous when mature, often punctate above when mature; lateral nerves 5-8—sometimes up to 10 on either half; base narrowed, often inequal; petiole 1-3·5 in. long, glands absent or inconspicuous. *Flowers* ·25 in. across, greenish yellow with an unpleasant smell, in slender axillary and extra-axillary interrupted drooping spikes from new shoots, 3-6 in. long, and hermaphrodite upper flowers often male; bracts minute, villous, caducous. *Calyx* hairy outside, woolly within, about ·25 in. across; limb cup-shaped, expanded, teeth 5, triangular. *Drupe* about 1 in. long, globose, often abruptly narrowed to a short stalk, grey velvety, obscurely ribbed when dry.

Throughout the province.

The fruit is the Belleric Myrobalan of commerce. It is largely used in indigenous medical practice. The kernel is edible but it is said to have narcotic properties. It yields an oil. The wood is yellow when freshly cut, turning yellowish or greyish brown. Medullary rays fine, pores joined by fine concentric lines. The timber is not durable but can be used for packing cases, posts for buildings, etc.

New leaves often copper coloured. Flrs. hot season after new leaves. Fr. 12-2.

2. Terminalia Chebula Retz. Vern. *Silikha*, Mech; *Artak*, Garo; *Halagach*—, Jharua; *Haritaki*, Beng. and Sans.; *Harra*, Hind.

A medium sized deciduous tree; bark grey or almost black, rough and furrowed outside; inside fibrous and reddish-brown, with a thin yellow layer near the cambium; young

parts shining, rusty, pubescent. *Leaves* 3-7·5 by 2-3·75 in., sub-opposite or alternate, acute, elliptic or ovate-oblong or shortly acuminate, silky when very young, glabrous with age; coriaceous; lateral nerves 6-12 on either half, arcuate, prominent; base rounded or cuneate, sometimes unequal; petiole ·5-1 in. long, usually with two sometimes more glands towards the top. *Spikes* usually 2-5·5 in. long, terminal or from upper leaf axils on new shoots, often paniced, sometimes fascicled, rusty pubescent when young. *Flowers* about ·1-·15 in. across with an offensive smell, all hermaphrodite; **bracts linear**, deciduous. *Limb* of calyx tube expanded and cup-shaped, glabrescent outside, villous inside. *Drupe* 1-2 in. long, obovoid or ellipsoid, smooth, more or less 5 ribbed, yellowish green when ripe; stone obscurely angled, rough, bony with gum vessels in the Walls.

Deciduous forests—GOALPARA, GARO-HILLS, KAMRUP.

The fruit is the Chebulic Myrobalan of commerce and is one of the best tanning materials we have. It is also largely used in medicine as a laxative, alterative and tonic. The unripe fruit on account of its astringent and aperient properties is a useful medicine for diarrhoea and dysentery. Water in which the fruits have been steeped overnight is a cooling wash for eyes affording relief in conjunctivitis and similar affections of the eye. The kernel yields a transparent oil. Wood very hard "brownish grey" with greenish or yellowish touch, heartwood dark purple, durable—it is used for furniture, carts, agricultural implements and house building—*Gamble*. The wood takes a good polish.

The tree varies a great deal in the pubescence of leaves and calyx and size and angularity of the fruit and apparently several forms if not varieties exist. 60-75 dry seeds go to the lb.

Flrs. hot season. Fr. 2-3 next year.

3. Terminalia citrina Roxb. Vern. *Senemphang*, *Suluka-baphong*, *Silika*, *Hartaki*, Cach., *Meng-suri-arong*, *Cheluka-arong*, Mik., *Soh-salukah*, *Soh-kykat*,? *Soh-Hardudiengartaki*, Kh.; *Logio-asing*, *Hilkang-asing*, Miri & Abor; *Hilikha*, Ass.; *Monalu*, Manip.; *Rerora*, Lush.; *Bekhla*, Tipp.; *Phakala*, *bakhla-rahtol*, Kuki; *Hartaki*, Sylh.; *Aritok*, *Bolomit*, Garo.

A medium sized to large deciduous tree, often with buttressed stem attaining 80 ft. in height. *Bark* grey or brown, slightly vertically fissured outside, light yellow, turning

brown and fibrous inside, about .3 in. thick. *Young* shoots shining, rusty or brown pubescent, soon glabrate. *Leaves* subopposite, 3.7-5 by 1.3-4 in., lanceolate or oblong-lanceolate to elliptic, acute or shortly acuminate; pubescent when young, glabrous and shining when mature; lateral nerves 8-12 on either half, curving upwards, nervules very finely reticulated, areoles white with very minute felt; base cuneate or rounded; petiole .4-1 in. long, biglandular, glands prominent, round. *Spikes* deciduously rusty puberulous, paniced at the ends of shoots with lower branches axillary or sometimes solitary and axillary. *Flowers* about .2 in. across, sessile, all hermaphrodite, each with a small linear silky pubescent deciduous bract, those towards the bottom of the spikes spatulate and larger downwards. *Calyx* glabrous outside, rusty villous within; limb broad, cupular; teeth 5, erect. *Drupe* 2-3 by .75-1 in., oblong-lanceolate, slightly clavate, smooth, glabrous, obscurely 5-ridged.

Throughout the province ascending to about 1500 ft. in the KHASI HILLS, often confused with *T. Chebula*.

Fruits are used medicinally similar to those of *T. Chebula*.

Flrs. 6-7. Fr. 1-2.

4. *Terminalia tomentosa* W & A. *Terminalia tomentosa* Bedd. Var. *typica*. Vern. *Kushi-bom-phang*, Mech.

A large to medium sized deciduous tree. *Bark* brown or grey, sometimes almost black, deeply furrowed, 1-1.5 in. thick; inside red, deeper layers paler, fibrous. *Young* parts rusty tomentose. *Leaves* subopposite, 4.5-9 by 2.5-4 in., oblong or elliptic or obovate-oblong, apex obtuse, broadly acute or short acuminate; entire or sometimes serrulate, silky pubescent and glabrescent with age above, more or less hairy specially along the nerves (in the form found in our area) beneath; lateral nerves 12-20 on either side; base often unequally cordate; petiole .25-.4 in. long, usually with 1-2 turbinate often stipitate glands at the junction with the midrib. *Flowers* about .15 in. across, dull yellow, bisexual; spikes erect, pubescent, paniced on the new shoots, lower branches from leaf axils; bracts subulate. *Calyx* hairy or glabrescent outside; limb cup-shaped, usually broader than long; teeth acute, hairy inside. *Drupe* 1.5-2.5 in. long,

with 5 coriaceous wings, .5-1 in. broad and marked with close horizontally parallel striations.

GOALPARA in mixed forests.

Heart-wood dark purplish-brown with darker streaks bleaching to a greyer tint on exposure. It polishes well and is then very handsome. It is generally used for house-building, agricultural implements, etc., in many parts of India but could be used also for panelling, decorative and furniture work. It is however liable to crack unless thoroughly seasoned. 150-250 seeds weigh a lb.

New leaves 3-5. Flrs. 4-6. Fr. 2-3.

5. Terminalia myriocarpa Heurek et Muell. Vern. *Holok*, Ass.; *Jhaluka*, Ass.; *Dieng-marao-ditar*, *Dieng-lang-sing-d-khar*, *Dieng-tal*, kh.; *Silok*, Miri and Abor; *Chalabophong*, *Jhalna*, Cach.; *Turtung arong*, Mik.; *Jhalna*, Manipur; *Chorpui*, Lush.; *Rakseng*, Garo.

A very large evergreen tree with pendulous branchlets; outer bark grey or brown, rough, peeling in vertical flakes; inside red, pale yellow towards the cambium, fibrous. *Young* parts and inflorescence rusty pubescent. *Leaves* 4-9 by 1.5-3 in., oblong-lanceolate to elliptic oblong, acute or shortly acuminate, denticulate or entire; lateral nerves many, about 25-36 on either side, subparallel, those near the base more straight; base inequal, narrowed, often subcordate, coriaceous, glabrous or with few hairs along the nerves; petiole thick, about .25-.3 in. long with 1-2 elongated glands near the top. *Flowers* .15 in. across, pink, each in the axils of a small lanceolate or deltoid subulate bracteoles. *Spikes* slender, lax, arranged in ample panicles, which are terminal and from upper leaf axils; upper bracts spathulate, lower gradually larger and leafy. *Limb* of calyx tube expanded, glabrous or nearly so outside, pubescent within; teeth erect; disk with few or no hairs; ovary pubescent. *Drupe* .15 in. long, yellow, 3 cornered, the lateral corners developing into short wings; .3-.5 in. across the wings.

In evergreen forests throughout ascending to about 2,000 ft. in the KHASI HILLS. "A very handsome tree in flower or fruit that is either loaded on its pendent boughs with pink flowers or yellow fruit"—Gamble.

Heart-wood brown with dark streaks, polishes well. The timber is fairly durable and is well adapted for cheap furniture, doors, windows,

railway carriages, tea boxes, house-building, etc. It makes excellent charcoal. Av. weight about 53 lbs. per c. ft. About 4,000-5,000 seeds weigh 1 oz.

Flrs. 10-11. Fr. 2-5.

Terminalia Catappa Linn. The Indian Almond Tree.—A tall tree with rough bark, stem often buttressed. *Leaves* 6-9 in. by 3-5-5 in., obovate or obovate-oblong from a narrow cordate base, softly hairy when young, glabrescent with age; midrib sometimes with 2 depressions near the base on the under side; petiole .5-.75 in. long, short, stout, channelled. *Flowers* white; spikes axillary, upper flowers male and shortly pedicelled, lower bisexual. *Calyx* glabrous outside. *Drupe* 1-2 in. long, glabrous, ellipsoid, slightly compressed, keeled all round, endocarp hard, kernel edible, oily.

Sometimes cultivated for fruits in plains districts.

Flrs. 3-5. Old leaves turn a beautiful crimson colour before dropping in January and February.

2. ANOGEISSUS Wall.

Anogeissus acuminata Wall.

A large graceful tree usually with pendulous branches. *Bark* grey, rough, about .75-1 in. thick; inside reddish brown, fibrous; shoots, branchlets and inflorescence softly adpressed tomentose. *Leaves* 1-5-3 by .5-1-2 in., sub-opposite, bifarious, oblong- to ovate-lanceolate, acute or sharply acuminate, entire, punctate, clothed with soft spreading hairs or nearly glabrescent above, with age, thin, translucent dotted (due to crystal cells); lateral nerves 5-7 on either side, arcuate; petiole up to .25 in. long, pubescent. *Flowers* very small, bisexual in globose peduncled heads up to .75 in. across. *Peduncles* axillary, solitary or sometimes two together, as long as the heads. *Bracts* at the base of the head, ovate-lanceolate to spatulate up to .15 in. long, brown tomentose; bracteoles minute, woolly, spatulate. *Calyx* superior, calyx tube pubescent, narrowed and prolonged above the ovary as a persistent beak with an expanded and deciduous campanulate 5-cleft limb, which is glabrate outside and woolly within. *Petals* 0. *Stamens* 10 in 2 series; filaments exserted. *Ovary* 1 celled with 2 pendulous ovules; style simple. *Fruit* .15-.3 in. across, samaroid, broader than long (with wings), coriaceous, broadly 2 winged with a beak, which is slightly longer than or about as long as the fruit,

glabrous except for the villous apical portion at the base of the beak, wings membranous, often irregularly denticulate at the edges; seed 1.

Chatta-chura Hill, NORTH CACHAR, Lambabak-LUSHAI HILLS.

Wood is used for cart axles and ploughs. It is moderately hard grey or yellow grey, warps and cracks in seasoning, not durable when exposed to wet. Av. weight about 50 lbs. per c. ft.

A. sericea Brandis.

A large tree; young shoots silvery; fl. heads axillary, generally single on long peduncles, frequently bearing leafy bracts. *Fruits* (not seen), tomentose with wings broader than long; wings jagged. *Calyx* often persistent at the end of the long tube.

Longai Reserve—SYLHET.—C. S. Purkayastha.

Flrs. 3.

3. COMBRETUM Linn.

Usually large straggling or scandent shrubs. *Leaves* usually opposite, rarely ternate or alternate, entire, petiolate. *Flowers* 4-5 merous, hermaphrodite or polygamo-diœcious, usually in paniced or simple spikes; bracts often large; bracteoles small. *Base* of calyx tube adnate to the ovary, 4-5 angled, constricted and more or less produced above the ovary; limb expanded, cup-shaped, funnel-shaped or campanulate, deciduous. *Disk* at the base of the calyx limb or lining it and then ending in a hairy ring. *Petals* inserted between the calyx teeth, rarely 0. *Stamens* twice as many as the petals, inserted on the disk. *Ovary* 1-celled; style subulate; ovules 2-5, pendulous from the top of the cell. *Fruit* 4-5 winged or ridged, dry, generally indehiscent; wings membranous.

I. Flowers 5-merous with 5 membranous wings :—

Bracts creamy white; calyx limb abruptly cup-shaped.

1. *C. decandrum*.

Bracts greenish, calyx limb gradually broader upwards and funnel-shaped.

2. *C. pilosum*.

II. Flowers 4-merous—fruit with 4 ridges :—

Disk at the base of the calyx limb not ending in a villous ring; calyx squamose outside.

3. *C. acuminatum*.

III. Flowers 4-merous, fruit with 4 wings :--

Disk lining the calyx limb and ending in a villous ring at the throat :—

A. Surface of fruits with fibrillar scales; calyx squamose; petals obovate, much longer than the calyx teeth.

4. *C. flagrocarpum*.

B. Surface of fruits without elongated fibrillar scales :—

1. Limb of calyx squamose, petals longer than or about as long as calyx teeth :—

a. Base of leaves never cordate :—

Young parts and inflorescence densely covered with copper coloured pale or peltate scales; calyx limb with a short tube; petals linear—spatulate, acute at apex.

5. *C. squamosum*.

Young parts and inflorescence sparsely dotted with glands, mature leaves slightly squamose or without glands; petals obovate.

6. *C. chinense*.

b. Base of leaves narrowed and cordate :—

Young parts villous, petals obovate.

7. *C. dasystachyum*.

2. Limb of calyx not squamose; petals minute and shorter than the calyx teeth, oblong-truncate and usually notched at apex :—

Tube of calyx limb much elongated, mature leaves not squamose, never cordate at the base.

8. *C. extensum*.

1. Combretum decandrum Roxb. Vern. *Lota-chali*, *Jonari-lewa*, *Jangta*, *Dhuna-sali*, *Tita-sali*, *Dhenai-sali*, *Droa-chali*, *Dhoba-lota*, *Bain-lewa*, Ass., *Arkeng-arong*, *Namarkeng*. Mik.; *Ther-sali*, *Mei-long-kha-saw*, Kh.; *Dugi-shing*, *Du-grak*, Garo; *Bandarebhra*, Nep.; *Koldam-hrui*, Lush.; *Damkol*, Tipp.

A large evergreen woody climber; young parts and inflorescence brown, silky-villous. *Bark* reddish-brown, peel-

ing off in thin flakes. *Leaves* opposite, 3-6 by 1·3-3 in., elliptic or elliptic to lanceolate, oblong, abruptly short acuminate, coriaceous, glabrous or with tufts of hair on the nerve axils, sometimes also sparsely pubescent on the midrib and the nerves beneath; lateral nerves 6-8 pairs, prominent beneath, arcuate, joined by numerous subparallel fine tertiaries; petiole ·2-·4 in. long. *Flowers* greenish-white, pentamerous, about ·2-·25 in. across, in dense spikes up to 3 in. long, usually arranged in terminal and axillary panicles, sometimes simple and fascicled from leaf axils. *Bracts* opposite, creamy-white, leaf-like, up to 3 in. long, upper gradually smaller, pubescent; bracteoles sub-persistent, villous, linear spatulate, acuminate, up to about 2 in. long. *Calyx* about ·15 in. long, hairy outside, expanded above the ovary into a cup-shaped limb, which is pubescent within, lobes abruptly linear acuminate from a broad base. *Disk* lining the base of the calyx limb, pubescent. *Petals* 5, slightly exceeding the calyx lobes, oblong or oblong-lanceolate, acute or acuminate, hairy. *Fruit* about 1 in. long with 5, less often 4 papery wings, each ·25-·3 in. broad.

Throughout the province, ascending to 1,500 ft. in the KHASI HILLS.

The bark is said to be chewed as substitute for betel nut.

Flrs. 11-1. Fr. 3-4.

2. *Combretum pilosum* Roxb.

A scandent shrub; branchlets clothed with soft rusty or brownish spreading hairs. *Leaves* opposite, 3·8-8 by 2·3 in., oblong-lanceolate to elliptic oblong, shortly acuminate, entire; coriaceous, shining, pubescent on the mid-rib and the nerves or glabrescent above and more thinly beneath, punctate and minutely papillose on the upper surface; lateral nerves 6-8 on either side, ascending, curved; base-cordate or retuse, slightly narrowed; petiole stout, ·2-·3 in., hairy. *Flowers* ·6-·7 in. long, 2-sexual, 5-merous, densely crowded in rusty or fulvous, silky-villous spikes, which are paniced at the ends of branches or from upper axils; bracteoles densely pilose, lanceolate or subulate-lanceolate up to ·25 in. long. *Calyx* limb ·4-·5 in. long, funnel-shaped from a shortly constricted base, 5-ridged and pubescent with soft hairs outside and below the

throat inside. *Calyx lobes* triangular, acuminate, about $\cdot 1\cdot 12$ in. long. *Disk* lining the base of the tube. *Petals* exceeding the calyx lobes about $\cdot 2$ in. long, oblong or narrow-obovate-obtuse, light pink, silky pubescent on the backs. *Stamens* 10, unequal, exserted, in 2 series, upper opposite the petals inserted between the calyx-lobes, lower alternating with them, basal portions adherent to the grooves formed by ridges of the calyx limb. *Ovary* 1-celled, pilose outside with spreading hairs; style exserted, pilose, slightly adnate to the calyx limb; ovules 2-or 1 by suppression, from the apex of the cell, suspended by long funicles. *Fruit* $1\cdot 1\cdot 25$ in. long, elliptic or ovate oblong with 5 chartaceous wings almost as broad as or broader than long.

Foot of KHASI and JAINTIA HILLS—Tharia, Bholaganj; SIB-SAGAR, Ranga-pahar Reserve.

Flrs. 1-2.

Var. *spinescens* with stout spines at the base of the branchlets—Keenan.

3. *Combretum acuminatum* Roxb. Vern. *Nahar-lata*, Ass.

Large woody climber with grey bark; young parts puberulous. *Leaves* opposite, $4\cdot 7\cdot 5$ by $1\cdot 3\cdot 4$ in., ovate or elliptic, oblong to oblong-lanceolate, acuminate, coriaceous, glabrous or puberulous along the midrib and nerves on the under surface, which is also minutely glandular or scaly punctate; lateral nerves 10-15 on either side, tertiaries strong, scalariform; base rounded, subcordate or acute; petiole $\cdot 2\cdot 4$ in. long, stout. *Spikes* usually 1-3 in. long, axillary and simple or forming leafy panicles at the ends of branches, pubescent and more or less dotted with minute round scales; bracteoles small, caducous. *Flowers* 4-merous, $\cdot 25$ in. across. *Calyx* dotted with minute round scales, puberulous and more densely scaly at the base; limb scarcely constricted above the ovary, campanulate; teeth erect, acute; disk at the base of the limb, glabrous or nearly so. *Petals* narrowly oblanceolate, acute, a little longer than the calyx teeth. *Fruit* 1-2 in. long, $\cdot 4\cdot 6$ in. broad, narrowly ellipsoid-narrowed at either end, bluntly 4 ridged, fluted between the ridges, brown.

SIBSAGAR, GOALPARA, Guma Reserve, LAKHIMPUR, KHASI HILLS up to 2,000 ft.

Flrs. 2-3. Fr. 7.

4. **Combretum flagrocarpum** Herb. Cal. *Tilli-lieh*, Synt.; *Arkeng-rekang*, Mik.; *Dugrak*, Garo; *Dukha-gajao*, Cach.; *Tairel*, *Rhui-keng-rathol*, Kuki.

A large straggling or scandent shrub; young parts and inflorescence pubescent or tomentose and also covered with round copper coloured or pale peltate scales. *Leaves* opposite, 3·7-7 by 1·7-3·5 in., elliptic to elliptic-oblong or ovate to obovate-lanceolate, more or less abruptly acuminate; thinly coriaceous with resinous dots on both surfaces—more numerous beneath, pubescent along the nerves or glabrescent above with age, tomentose or pubescent at least along the nerves beneath, sometimes nearly glabrous with age; lateral nerves arcuate, 10-12 on either side; base rounded or narrowed; petiole stout, up to ·4 in. long. *Spikes* usually paniced, terminal or axillary, in the latter case sometimes simple; panicle branches opposite, sometimes 2 together. *Flowers* 4-merous, ·25-·4 in. long (excluding the stamens) each in the axil of a bracteole; bracteoles linear to linear spathulate, gradually larger downwards, ·15-·4 in. long. *Calyx* densely covered with scales; limb funnel-shaped with an abruptly dilated cupular mouth. *Calyx teeth* erect, triangular. *Petals* white (drying yellow), about ·1 in. long, much larger than the calyx teeth, broadly obovate, shortly clawed. *Disk* lining the free portion of calyx tube and ending in a villous ring. *Fruit* 1-1·5 in. long, 4-winged, dotted with resinous glands, densely beset on the space between the wings with linear-lanceolate scales.

N. E. FRONTIER, LAKHIMPUR, SIBSAGAR, CACHAR, KHASI HILLS up to 4,000 ft., GARO HILLS. Probably all over UPPER ASSAM.

Flrs. 4-6. Fr. 12.

5. **Combretum squamosum** Roxb. Vern. *Thlai-riel*, Lush.; *Soh-risang*, Kh.; *Setta-abung-taru*, Duff.

A large woody climber with dark brown or grey bark; softer parts covered all over with minute peltate, round,

coppery, pale or ultimately greyish white scales, more densely when young, pale to coppery. *Leaves* opposite, 4-8 by 2-4 in., usually oblong to suborbicular-elliptic or obovate to elliptic, sometimes orbicular, upper leaves smaller and narrower, short-acuminate or apiculate; coriaceous, sometimes glands disappearing with age; lateral nerves 5-7, distant; base cuneate or rounded; petiole .5-1 in. long, stout, channelled. *Spikes* paniced at the ends of branches or from upper axils, the latter often branched; panicle branches usually opposite, lower bracts leafy, upper gradually smaller; bracteoles subulate. *Flowers* 4-merous, about .3 in. long, bisexual. *Free* portion of calyx tube funnel-shaped with a cupular mouth. *Calyx* teeth triangular. *Petals* minute, spathulate, tapering to the claw, slightly longer than or the same size as the calyx teeth. *Disk* thin, lining the base of the calyx limb and ending in a fulvous woolly ring. *Fruit* 1-1.5 in. long with 4 wings covered with scales or glabrous with age; wings .3-.5 in. broad.

UPPER ASSAM, GARO HILLS, ascending to 2,500 ft. in the KHASI HILLS.

Flrs. 10-1. Fr. 4.

6. *Combretum chinense* Roxb. Vern. *Dukha-rau-thau-di*, Cach.?

A large woody climber, branchlets and inflorescence sparsely dotted with minute scales. *Leaves* opposite or 3 in a whorl, 2.5-5 by 1.5-2.5 in., elliptic, elliptic oblong or obovate, shortly blunt acuminate; glabrous or glabrescent and punctate on both surfaces, often with minute scales; main nerves 5-9 on either side, arched; base acute, abruptly cuneate or narrowed; petiole .2-.5 in. long, pubescent. *Spikes* axillary, 1.5-3 in. long, many flowered, pubescent; bracteoles linear, deciduous. *Flowers* 4-merous. *Calyx* dotted with scales and minutely pubescent outside; limb .25 in. long, slender at the base and then funnel-shaped. *Petals* broadly obovate, clawed, exceeding the calyx teeth. *Calyx* teeth acute, erect. *Disk* and the limb inside fulvous pubescent. *Fruit* about 1.2-1.5 in., long and 1-1.2 in. broad;

wings slightly unequal, horizontally striate, dotted with few glands.

CACHAR; Dehing river—LAKHIMPUR—Gammie, KAMRUP—Mann.

7. *Combretum dasystachyum* Kurz. Vern. *Dugrak*, Garo; *Holoklota*, Miri & Ass.; *Arkeng-ket*, Mik.; *Mei-ju-ne*, Kh.

A stout woody climber; young parts and inflorescence usually rusty hirsute or villous. *Leaves* 2·5-8 (sometimes up to 10 in. long) by 1·2-3·7 in., opposite or sometimes ternate, oblong-lanceolate to elliptic, oblanceolate or obovate from a narrowed cordate or subcordate base, acuminate, thin, somewhat rough with minute punctulate dots, glabrous above, undersurface glabrate except of hairs along the nerves axils; lateral nerves 7-10 on either side; petiole stout, short, up to ·3 in. long, glabrate or hairy. *Spikes* simple, sometimes branched, axillary, much shorter than the leaves. *Flowers* bisexual, 4-merous, about ·5 in. long; bracteoles linear, shorter than the flowers. *Calyx* densely covered outside with copper coloured or pale round scales; free portion constricted above the ovary and then funnel-shaped with the disk lining the bottom and ending in a villous ring, teeth triangular. *Petals* small, obovate-narrowed into the claw, slightly longer than the calyx teeth or about as long. *Fruit* 1-1·5 in. long, stipitate with the wings, broader than or as broad as long, shining, usually dotted with scattered glands or sometimes without glands; wings ·3-·75 in. broad.

All over UPPER ASSAM, GARO HILLS, ascending to 2,500 ft. in KHASI HILLS.

Flrs. 3-6. Fr. 12-2.

8. *Combretum extensum* Roxb. Vern. *Rekang-uphang*, Mik.

A large woody climber. *Bark* dark-brown with close but very shallow vertical furrows; branchlets glabrous. *Leaves* opposite or sub-opposite, 4-7 by 2·2-4·5 in., broadly or sub-orbicular-elliptic, elliptic-oblong or broad ovate, shortly

and often abruptly acuminate or sub-acute; base broad and abruptly narrowed on the petiole or cuneate, coriaceous, glabrous on both surfaces, somewhat rough and punctate beneath; lateral nerves 6-8 on either side, arched near the margin, upper meeting in loops; petiole .6-1 in. long, stout. *Spikes* from axils of existing or fallen leaves, simple or paniced, pubescent or puberulous. *Flowers* 4-merous, about .35-.45 in. long and .25-.3 in. across. *Ovary* downy. *Calyx* constricted above the ovary into an elongated tube and then expanded into a funnel-shaped puberulous limb; lobes acuminate, reflexed, about .1 in. long; disk lining the limb of the calyx and ending in a hairy ring at the throat. *Petals* shorter than the calyx lobes, truncate-oblong or sometimes obovate, usually notched at the apex. *Fruit* 1.25-1.5 in. long and nearly as broad (with wings); wings scariose.

SIBSAGAR—Bokajan reserve, CACHAR, Chatta-cherra, low elevations in KHASI HILLS—Thleu syryngam.

Flrs. 12-1.

C. sundaicum Miq. Vern. *Dukhar-rau*, *Thaudi*, Cach. Closely allied to the above and doubtful if a distinct species. *Leaves* 3-5 in., ovate or oblong, suddenly acuminate, nearly glabrous when mature, punctulate on both surfaces; petiole about .5 in. long. *Spikes* dense, paniced. *Calyx* with a ring of hairs at the base. *Fruit* as in *C. extensum*.

N. CACHAR HILLS, Langting. Sheet No. 5574—rather incomplete.

4. QUISQUALIS Linn.

Quisqualis indica Linn. Vern. *Malati*, Beng. The Rangoon creeper.

A large scandent shrub. *Leaves* 2-4 by 1.5-2 in., elliptic-acuminate, softly pubescent at least on the beneath; petiole .2-.4 in. *Flowers* 5-merous, handsome, scented, at first white and then turning red. *Calyx* limb slender up to about 2.5 in. long; petals about .5 in. long.

A native of Eastern Burma, Malay Peninsula and Java; often cultivated as an ornamental plant.

Flrs. hot and rainy season.

5. CALYCOPTERIS Lamk.

Calycopteris floribunda Lamk.

A somewhat variable diffuse scandent shrub with drooping branches. *Bark* corky, light brownish grey, reticulately but very irregularly fissured outside, about .3 in. thick on old stems. *Branchlets* terete, rusty tomentose or glabrous. *Leaves* opposite, 2.5 by 1.2.5 in., elliptic to lanceolate or ovate-oblong, acute or acuminate, rusty tomentose or glabrous beneath, with minute pits containing resinous glands, thinly coriaceous, entire; lateral nerves 7-9 on either side; tertiaries reticulate; petiole .2-.3 in. long, slightly channelled, rusty tomentose. *Flowers* bisexual, .5 in. across, rusty tomentose all over in axillary and terminal panicles, crowded towards the ends of branches; bracts leaf like. *Calyx* 5, striate and produced above the ovary; limb 5 fid, .2-.3 in. long, persistent and accrescent in fruit. *Petals* 0. *Stamens* 10, unequal, 5 upper ones between the calyx lobes, remaining 5 lower down on the calyx tube and alternating with the upper stamens, all shorter than the calyx lobes. *Ovary* 1-celled, inferior; style subulate; ovules pendulous from the top of the cell. *Fruit* narrowly ellipsoid-oblong, obtusely 5-angled; limb about .15 in. deep; wings .5-.6 by .2 in., oblanceolate or obovate, membranous, 3-veined.

ASSAM—*C. B. Clarke in F. B. I.*

There are no specimens at Calcutta from our area.

Flrs. 1-3. Fr. 2-4.

FAM. 57. MYRTACEÆ.

Trees or shrubs, rarely herbs. *Leaves* entire, opposite, rarely alternate (*Eucalyptus*), usually with an intramarginal nerve and dotted with oil glands, as are usually also young branchlet, parts of the flower and fruit; stipules 0 or minute,

deciduous. *Flowers* regular, hermaphrodite or rarely polygamous, axillary or terminal, solitary or in cymes or corymbs; bracteoles usually 2, sometimes 0. *Calyx-tube* more or less adnate to the ovary and sometimes produced above it, often with a disk lining the limb; calyx-lobes 4-5, persistent or deciduous, imbricate and often closed in bud. *Petals* as many as the lobes of the calyx, rarely 0, inserted on the margin of the disk or on the mouth of the calyx-tube, imbricate, sometimes connate and falling off as a cap. *Stamens* numerous in one or more rows within the petals, often inflexed in bud; anthers 2-celled. *Ovary* inferior or $\frac{1}{2}$ inferior, usually 2, or 1-many celled; style simple; stigma small; ovules axile, usually numerous. *Fruit* crowned with the calyx-limb, baccate or capsular; seeds many or 1 or few by abortion, exalbuminous.

I. Leaves usually opposite; fruit baccate :—

Calyx 4-lobed; ovary 2-celled; seeds

1 or few.

Calyx 4-5 lobed; ovary usually

4-celled; seeds many.

1. **Eugenia.**

2. **Decaspermum.**

II. Leaves (of older plants alternate); fruit

capsular.

3. **Eucalyptus.**

1. EUGENIA Linn.

Trees or shrubs, evergreen or nearly so; young branchlets, leaves, parts of the flower and the fruit usually dotted with pellucid oil cavities. *Leaves* opposite, penninerved, exstipulate. *Flowers* solitary and axillary or in simple, racemed or dichotomously branched panicles. *Calyx-tube* usually articulated to the pedicel, often with two bracteoles at the base, adnate to the ovary, produced above the ovary or not, with 4-5 (rarely 5) lobes or segments or limb, subtruncate. *Petals* 4, rarely 5 or more or 0, free and spreading or united into a cap (calyptra). *Stamens* numerous in several series; filaments free or slightly combined into 4 bundles, inserted on the edge of the disk at the mouth of the calyx-tube; anthers small, versatile, often with a gland at the tip, dehiscing longitudinally. *Ovary* 2-rarely 3-celled; ovules many in each cell but only 1-few developing; style simple. *Berry* drupe-like, rarely dry and fibrous, crowned with the remains of the persistent calyx-limb; seeds 1 or few; embryo

fleshy, thick with a short radicle; cotyledons thick, free or more or less united.

The genus *Eugenia* is often broken up into several genera. As the common characters of the group are easy to recognise in the field, the old arrangement of including these plants under one genus has been adhered to. These new genera have been referred to as sections in the key.

Sect. I. JAMBOSA. *Flowers* in cymes, usually large. *Calyx-tube* produced beyond the ovary, usually with a thickened disk at the mouth and with 4 persistent rounded lobes. *Petals* free. *Stamens* bent inwards in the middle in bud. *Berry* crowned by the calyx-limb and the thickened disk; seeds large, angled :—

I. Flowers one inch or more across, showy :—

A. Petals usually 4 :—

1. Leaves rounded or cordate at the base; petioles very short :—

a. Fruit globose :—

i. Flowers pedicellate; pedicels exceeding .3 in., not stout; inflorescence lateral from axils of fallen leaves. ..

1. *E. formosa.*

ii. Flowers sessile or subsessile; pedicel when present stout; cymes usually terminal. ..

2. *E. macrocarpa.*

iii. Flowers on very short pedicels, .3 in. and less long; pedicels slender; inflorescence terminal. ..

3. *E. diospyrifolia.*

b. Fruit depressed, turbinate, flattened at both ends; cymes terminal and from upper leaf axils. ..

4. *E. aquea.*

2. Leaves narrowed at both ends :—

Leaves 3 in. and over across, elliptic or ovate; flowers pink or purple, solitary or in few flowered cymes from the axils of fallen leaves. ..

5. *E. malaccensis.*

Leaves 2 in. and under across, lanceolate or oblong lanceolate; flowers white, in raceme-like or paniced cymes. ..

6. *E. Jambos.*

B. Petals usually 12-16; leaves marrow, lanceolate, usually ternate. ..

7. *E. polypetala.*

II. Flowers under 1 in. across :—

A. Lateral nerves of leaves usually 20 pairs or less :—

1. Petals 4 :—

a. Leaves not abruptly acuminate :—

- i. Flowers sessile; calyx tube .25-.3 in. long, abruptly narrowed from a wide limb; calyx lobes minute, .1 in. or less across; berry obovoid-oblong, about .6 in. long. 8. *E. Wallichii*.

- ii. Flowers pedicellate, calyx-tube .3-.4 in. long, clavate, turbinate, attenuated to the basal portion; calyx lobes .2 in. across; berry globose, about .5 in. long. 9. *E. Kurzii*.

- iii. Flowers on long slender pedicels; calyx tube .5-.6 in. long, obconic, narrowed to a very slender pedicel-like basal portion, covered with conspicuous raised glands; berry about 1 in. long, ovoid or ellipsoid. 10. *E. bifaria*.

b. Leaves usually abruptly acuminate or shortly caudate :—

- i. Leaves over 5 in. long, thickly coriaceous; lateral nerves 13-20 pairs; inflorescence with stout branches; flowers sessile; calyx-tube broadly turbinate. 11. *E. grandis*.

- ii. Leaves 4.5 in. and less in length, thin; lateral nerves 8-10 pairs; inflorescence branches slender; flowers pedicellate; calyx-tube obconic. 12. *E. ramosissima*.

2. Petals usually 8. 13. *E. anisopetala*.

- B. Lateral nerves of leaves numerous and parallel. 14. *E. mangifolia*

Sect. II. *Syzygium*. Flowers usually small in cymes, often corymbose. Calyx-tube produced beyond the ovary, but without a thickened staminal disk at the mouth, 4-rarely 5-lobed or sub-truncate. Petals falling off in one piece as a lid or less often free. Stamens bent inwards in the middle in the bud. Berry crowned by the calyx-limb.

I. Petals free, usually not falling off as one piece :—

Lateral nerves of leaves close and sub-parallel :—

- A. Calyx-tube hemispheric, turbinate or campanulate, .2 in. or less long :—
 - 1. Petals 4, fruit globose :—
 - a. Berry .25-.3 in. across; calyx-limb campanulate. .. 15. *E. cymosa.*
 - b. Berry .5 in. across; calyx-limb hemispheric, turbinate. .. 16. *E. saligna.*
 - 2. Petals 5-6, fruit ovoid. .. 17. *E. prætermissa.*
 - B. Calyx-tube cylindrical; .5-.7 in. long; buds clavate. .. 18. *E. claviflora.*
- II. Petals falling off mostly in a calyptra :—
- A. Flowers mostly from axils of fallen leaves and lower leaf axils :—
 - 1. Lateral nerves distant, 8-20 pairs :—
 - a. Tree; branchlets sharply 4-angled; panicles up to 1.5 in. long, with stout branches; calyx-tube usually with minute lobes. .. 19. *E. tetragona.*
 - b. Shrub; panicles up to 2.5 in. long, with slender brachiate branches; calyx-tube usually truncate. .. 20. *E. balsamea.*
 - c. Tree; branchlets compressed, panicles 2-6 in. long, with spreading branches; calyx-tube with distinct lobes. .. 21. *E. operculata*
 - 2. Lateral nerves of leaves numerous, slender, closely sub-parallel :—
 - a. Panicle branches not sharply angled; flowers over .25 in. across, fruit up to 1.5 in. long, oblong, usually curved. .. 22. *E. Jambolana.*
 - b. Panicle branches sharply 4-angled; flowers very small, under .2 in. across; fruit more or less globose not curved. .. 23. *E. fruticosa.*
 - B. Flowers mostly terminal and axillary :—
 Lateral nerves numerous, slender and closely subparallel :—
 - I. Leaves 3 in. and above long :—
 - a. Flowers very small, about .25 in. across when fully formed; calyx-tube truncate or nearly so. .. 24. *E. khasyana.*
 - b. Flowers about .5 in. across when fully expanded; calyx-tube with distinct persistent lobes. .. 25. *E. oblata.*
 - 2. Leaves small, less than 3 in. long. 26. *E. cuneata.*

Sect. III. *Eugenia proper*. Flowers solitary, fascicled or sub-racemose. *Calyx-tube* not produced above the ovary, nearly globose; lobes 4, rarely 5, persistent. *Petals* 4, rarely 5, distinct. *Stamens* erect or incurved, not bent inwards at the middle in buds:—

Flowers solitary or in fascicles; young
parts pubescent. 27. *E. bracteata*.

1. *Eugenia formosa* Wall. Vern. *Ankhi-siphak*, *Ankhi-siphasi*, *Bor-subok*, Garo; *Bamthair-angoli*, *Lohajam* (?), *Bhukua-chepa*, *Labung-garai*, Ass.; *Bomkhang-khrai*, Mech; *Mirtephong*, *Chahar-long-arong*, Mik.; *Kurak*, Daffla; *Dieng-Sa-ludong*, Synt.

A moderate or medium-sized tree, stem sometimes buttressed. *Bark* light grey, nearly smooth, green under the corky layers; blaze light brown and fibrous; branchlets more or less compressed. *Leaves* 6-15 by 2·5-6 in., shortly petioled or nearly sessile, obovate-to elliptic-oblong or oblong-lanceolate, long or bluntly short acuminate, coriaceous, glabrous, shining above, under-surface paler, midrib stout; lateral nerves 12-15, rarely more on either side, with strong intermediates in between, prominent beneath, meeting to form a wavy intramarginal nerve which is somewhat discontinuous towards the base; base usually narrowed, cordate or sub-amplexicaul. *Flowers* about 1·5 in. across, rosy pink or nearly white in corymbose cymes, usually from the axils of fallen or sometimes of existing leaves; pedicels ·3-1·5 in. long—rarely longer, slightly thickened upwards, with two minute deciduous bracteoles at the articulation with the calyx-tube. *Calyx* purplish, ·6-·9 in. long; calyx-tube broadly-turbinate, ·5-·7 in. long, abruptly narrowed to the pedicel; limb much produced; calyx lobes in unequal pairs, broader than long, ·3-·4 in. across, spreading. *Petals* free, about ·5 in. across, orbicular, shortly clawed; filaments 1-2 in. long. *Berry* globose, 1-2 in. across, white or pinkish when ripe, crowned with the persistent calyx-limb and the style; seeds rugose, greenish.

LAKHIMPUR, DARRANG, NOWGONG, KHASI HILLS, GARO HILLS—C. B. Clarke!—ascending to 4,500 ft. in the Hills.

The calyx is said to be eaten cooked. Wood hard, about 61 lbs. per c. ft.

Flrs. 3-4.

Var. *ternifolia* F. B. I. Leaves in threes, sessile or nearly so.

A form with long acuminate narrow leaves, which are sometimes only 5 by 1·5 in. with more sharply defined and continuous intramarginal nerves than in the type should perhaps be separated as a variety. This, however, passes through intermediate forms into the type. This is the commoner form in hilly country.

2. *Eugenia macrocarpa* Roxb. Vern. *Selua*, *Kachal-pabok*, Kuki; *Kechal-pare-bung*, Tipp.; *Shishong-phong*, Cach.; *Prandab*, Mik.

A moderate or middle-sized tree. *Bark* grey or greenish grey, nearly smooth or with shallow fissures; blaze reddish-brown, fibrous. *Leaves* 6-14 by 2·2-5·2 in., oblong-lanceolate to—elliptic or oblanceolate, shortly acuminate; coriaceous, glabrous; lateral nerves 15-25, with intermediates between, prominent beneath, joined by a somewhat wavy but continuous intramarginal nerve; base often narrowed, rounded or subcordate; petiole very short, up to ·5 in. long, thick. *Cymes* subcorymbose, few flowered, terminal, rarely axillary. *Flowers* sessile or subsessile, about 2·25 in. across, pale pink; pedicel when present very short and stout, with a pair of deciduous bracteoles upto ·15 in. long on the joint. *Calyx-tube* ·6-1·2 in. long, turbinate, longitudinally striate in dry specimens; calyx-lobes 4, unequal, broader than long, rounded, larger pair ·4·6 in. across. *Petals* 4, free, orbicular, up to 1 in. across with a broad base. *Filaments* 1·1-1·6 in. long; style exceeding the filaments. *Berry* “about the size of an orange”—Brandis—globose, several seeded, crowned by the inflexed calyx lobes, edible.

CACHAR; N. C. HILLS; SYLHET, KHASI AND JAINTIA HILLS up to 1,000 ft., *e.g.*, Hatmawdan; SIBSAGAR; N. E. FRONTIER; LAKHIMPUR.

The timber is considered to be hard and durable.

Flrs. 3-4. Fr. 8.

A tree (Kanjilal's Sheet No. 3254—Assam Herbarium from Rajgarhali in Lakhimpur Dist.) with large obovate coriaceous leaves apex and 12-15 somewhat distant lateral nerves on either side of midrib and oblong fruits 1·5 in. long may be an extreme form of this, unless it is a new species. The material is insufficient for ascertaining its correct position

3. *Eugenia diospyrifolia* Wall. Cat. 3617.

A small tree. *Leaves* 4-7 by 1·2-2·2 in., oblong-lanceolate or lanceolate, acuminate, with a cordate or sub-amplexicaul base, coriaceous, glabrous; main lateral nerves 12-14 on either side, somewhat indistinct on the upper surface uniting in a wavy intra-marginal nerve, tertiaries indistinct; petiole 0 or very short. *Flowers* white, sessile or sub-sessile, about 1 in. across, in few flowered terminal cymes; pedicels 0·3 in. long, not stout, jointed to the calyx, with 2 minute bracteoles at the joint. *Calyx-tube* ·5-·7 in. long, turbinate, much attenuated towards the base; calyx-lobes ·3-·4 in. across, orbicular. *Petals* orbicular, ·4 in. across; style exceeding the stamens, about 1 in. long. *Berry* more or less globose, 1-1·5 in. across.

Rangma reserve, SIBSAGAR, SYLHET. Wallich! KHASI HILLS, GARO HILLS.

Flrs. 8-11. Fr. 1-4.

E. Munronii Wight, Ic. II-14.

A middle-sized (?) handsome tree. *Leaves* 5-8·5 in., lanceolate, somewhat bluntly acuminate; base cordate, coriaceous, glabrous; main lateral nerves 12-17 on either side of midrib; pedicels short, up to ·3 in. long, stout. *Flowers* white, 1·5 in. across in terminal, usually compound cymes. *Calyx-tube* ·5-·6 in. long, obconic, attenuated to a slender pedicel upto ·3 in. long. *Fruit* globose, about ·7 in. long.

The only specimen under this name in Herb. Cal. is Burkill's 733 from Khasi Hills. This has neither flowers nor fruit and I am unable to distinguish it in this state from *E. diospyrifolia*. Hooker and Thompson's sheets are not represented in the herbarium.

4. *Eugenia aquea* Burm. *E. aquea* F. B. I. in part. Vern. *Dieng-soh-liwa*. Kh.; *Dieng-sa-li-dong*, Synt.

A moderate-sized tree with grey-bark; branchlets 4-angled. *Leaves* 5-12 by 1-3·2 in., oblong-lanceolate or lanceolate, acuminate; base narrowed, cordate or rounded, coriaceous, glabrous; midrib channelled above, prominent beneath; main lateral nerves 15-20 on either half, often with a few intermediates, all meeting in a prominent intramarginal nerve, ·15-·3 in. from the margin; petiole ·1-·2 in. long, stout. *Flowers* 1-1·5 in. across, greenish white ("white, red

or pale purple"—Duthie in F. B. I.), solitary or in few flowered cymes, which are terminal or from upper leaf axils; pedicels slender, .25-.4 in. long. *Calyx-tube* turbinate, attenuated to the base, .75-1 in. long; lobes unequal, broader than long, larger pair .4-.6 in. across, rounded. *Petals* 4, free, rounded, about .4 in. long. *Berry* .6-1 (?) in. across, depressed, turbinate, flattened at both ends, crowned by the calyx-lobes, 1-4 seeded.

LAKHIMPUR, KHASI HILLS, upto 4,500 ft., CACHAR—Prazer!

Flrs. 3-4, also 10—a second flush?

The Assam sheets in Calcutta Herbarium do not agree with the Burma and S. India sheets. They differ mainly by their narrower leaves, larger number of lateral nerves and fewer flowered cymes. The Burma sheets have broader—elliptic or elliptic lanceolate leaves with 8-12 pairs of distant lateral nerves and somewhat lax, corymbose, peduncled branched cymes. There is little to distinguish the Assam plant from *E. diospyrifolia*, except the larger number of lateral nerves and the shape of the fruit. Further field studies are necessary to settle if these represent two forms of the same species. In the Calcutta herbarium more than one species have apparently been included under this name. Wall. Cat. 3613 agrees with description in F. B. I. but this does not appear to be the plant illustrated in Wight's Icones t.550 and described by Roxburgh in *Flora Indica* and by Kurz in his *Forest Flora of British Burma* or referred in Wight's Illustrations ii-14.

5. *Eugenia malaccansis* Linn. Vern. *Pani-jamuk*, Ass.; *Lal-jamrul*, Beng.

A handsome tree with compressed branchlets. *Leaves* 6-12 by 3-4.5 in., oblanceolate, obovate-lanceolate or elliptic-oblong, short acuminate, glossy above, coriaceous; lateral nerves 10-15 on either side of midrib, all except the lowest anastomosing to form a wavy intramarginal nerve, intermediates rather indistinct; base narrowed or tapering to the short stout petiole; petiole stout, .3-.5 in. long. *Flowers* red or purple, 1-1.5 in. across, sessile or sub-sessile, solitary or in short peduncled cymes from the axils of fallen leaves. *Calyx* .5-.7 in. long; calyx-tube clavate-turbinate; base narrowed and solid; lobes rounded, unequal, broader than long, larger pair .3-.4 in. across. *Petals* free, about .5 in. long with a broad claw, nearly as broad as or broader

than long. *Stamens* about 1 in. long. *Berries* 2 in. long, obovoid or depressed, turbinate, crowned by the inflexed calyx-lobes, pink or purple when ripe.

Cultivated.

Flrs. 4-5. Fr. 5-6.

Eugenia javanica Lamk. Vern. *Jamrul*, Beng.

A moderate to medium-sized tree. *Leaves* 5-10 in. long, elliptic-oblong, shortly acuminate or rounded; base rounded or subcordate, thinly coriaceous, glabrous; lateral nerves prominent beneath, looped within the margins. *Flowers* 4-merous, white, about 1·5 in. across, in peduncled, compound and lax cymes, which are shorter than the leaves and terminal or lateral, often from axils of fallen leaves. *Calyx-tube* turbinate. *Berries* about 2 in. across, depressed, turbinate, crowned by the inflexed calyx-lobes, white or pinkish-white, juicy and slightly acid, flavourless.

Often cultivated for the fruits, which are considered cooling.

Flrs. 3-4. Fr. 5.

6. Eugenia Jambos Linn. Vern. *Golapi-jamuk*, *bangali-jamuk*, *boga-jamuk*, Ass.; *Golapjam*, Beng. The rose apple.

A medium-sized handsome evergreen tree. *Bark* grey to almost black; blaze brownish. *Leaves* 4·5-8 by 1·2 in., narrowly oblong-lanceolate to lanceolate, tapering to an acuminate apex and also at the base, coriaceous, glabrous; lateral nerves distinct beneath, 10-20 on either half, slender, often with intermediates between, joined by a prominent intramarginal nerve; petiole ·2-·4 in. long, stout, channelled. *Flowers* white, about 1·5 in. across, in few flowered terminal raceme-like cymes or sometimes paniced; pedicels upto ·4 in long; lateral largest, with a pair of small caducous bracteoles at the top. *Calyx* turbinate, ·6 in. long; lobes sub-equal, rounded, upto ·4 in. across. *Petals* 4, free, about ·6 in. across, as broad as or broader than long. *Filaments* 1·25 in. long, subulate. *Berry* 1·2 in. across, white or yellowish when ripe, sometimes winged with pink, globose or pyriform, crowned by the inflexed calyx-lobes, delicately rose-scented, and sweet but rather dry.

Cultivated for the fruits in the plains and low elevations in most districts, sometimes found as an escape, *e.g.*, SIBSAGAR—Gaurisagar, Bez Barua's grant; DARRANG; LAKHIMPUR—Jokai reserve.

Flrs. 2-4, sometimes a little later in hilly country. Fr. 6-7.

7. *Eugenia polypetala* Wight.

A small tree with grey bark; branchlets whitish, prominently marked with scars of fallen leaves. *Leaves* ternate or sometimes 4 in a whorl, nearly opposite, 3·5-6 by ·3-1 in., narrow to linear lanceolate, bluntly acuminate, sub-coriaceous, with thickened recurved margins; main lateral nerves slender, about 10-12 on either side, all except the lowest anastomosing to form the intramarginal nerve, tertiary nerves laxly reticulate; base narrowed, often attenuate to the petiole; petiole ·1-·2 in. long, stout, margined. *Inflorescence* of peduncled, few flowered corymbose cymes, 1-2 in. long or solitary from the axils of fallen leaves. *Flowers* 1-1·5 in. across, white, "scented"—Brandis; pedicels ·4-1 in. long, slender with 3 or 2 deciduous lanceolate or spatulate bracteoles, up to ·15 in. long at the top. *Calyx-tube* ·6-·8 in. long, reddish brown; limb broadly campanulate; calyx-lobes 4 or 6, rounded, broader than long, about ·4 in. across. *Petals* orbicular, free, many, usually 12-16;* style about 1·5 in. long. *Fruit* not seen.

Rocky river banks at low elevations.

Panduah—SYLHET, Wall. Cat. 3616! KHASI HILLS—Griffith!
Ghangail—LUSHAI HILLS, Prazer!

Flrs. 3-4.

8. *Eugenia præcox* Roxb. Syn. *E. Wallichii* Wight. III. ii. 17. Ic. t. 536. Vern. *Serbai-boga-jamuk*, Ass.; *Khorjam*, *Jam-biphang*, Cach.; *Panijam*, Cach. and Manipur; *Dieng-mirchangkh*, *Manhumi*, Kuki; *Ramui*, Tipp.

A tree attaining large dimensions under favourable conditions. *Bark* grey or pale white, outermost layers of thin papery cork, reddish-brown and fibrous inside; branchlets compressed. *Leaves* 4-10·3 by 1·5-2·5 in., oblong-

* 4-16—Brandis.

lanceolate or lanceolate, acuminate, thinly coriaceous, under-surface brownish; lateral nerves 10-14 on either half, prominent on both surfaces—at least in dry specimens, uniting twice within the margin, outer reticulations slender, intramarginal nerve usually discontinuous towards the base; petiole .4-.5 in. long. *Cymes* usually compound, sub-corymbosely paniced, often branched from near the base or fasciculate, 1-2.5 in. long, axillary, terminal or sometimes from axils of fallen leaves. *Flowers* white, .4-.5 in. across, usually sessile or nearly so. *Calyx-tube* turbinate, .25-.3 in. long, abruptly narrowed to the pedicel like basal portion; calyx-lobes unequal, broad ovate to orbicular, up to .1 in. across. *Petals* white, rounded, about .15 in. across, free. *Stamens* up to about .5 in. long; style long, persistent. *Berry* about .6 in. long, obovoid-oblong, crowned by the incurved calyx-lobes.

Nearly all over the Province ascending to about 1,000 ft. in the KHASI HILLS.

The fruit is edible.

Flrs. 12-2. Fr. 4.

Var. *lancæfolia* F. B. I. Leaves narrower-lanceolate than in the type, rounded or subacute at the base; petiole .3-.4 in. long.

GARO HILLS—Fisher! SYLHET—Roxburgh.

9. *Eugenia Kurzii* Duthie. Vern. *Girgum-dotke-asing*, Miri; *Bogi-jamuk*, Ass.; *Sel-bel*, Garo.

A moderate-sized to large tree with pale grey compressed branchlets. *Bark* brownish-grey, exfoliating in thin flakes. *Leaves* 4-8 by 1.5-3 in., lanceolate to elliptic lanceolate or oblanceolate, usually somewhat bluntly acuminate at the apex and attenuate or acute at the base, glabrous, under-surface paler, thinly coriaceous, gland dots small, pellucid; lateral nerves 8-14 on either half, slender, meeting in loops and forming a very wavy intramarginal nerve often discontinuous towards the base; petiole .5-.8 in. long. *Flowers* white, .6 in. across. *Cymes* branched or paniced, .3-2.7 in. long, solitary or fascicled in leaf-axils or axils of fallen leaves; pedicels up to .5 in. long. *Calyx-tube* .3-.4 in.

long, clavate-turbinate, attenuated to the basal portion; calyx-lobes up to .2 in. across, rounded, ultimately reflexed. *Petals* free, .2-.25 in. across; style persistent. *Berry* globose, up to .5 in. long, crowned by the spreading calyx-limb.

N. E. FRONTIER, LAKHIMPUR, SIBSAGAR, KHASI AND JAINTIA HILLS, ascending to 2,500 ft., GARO HILLS, CACHAR—*Keenan*, probably also in other Districts in UPPER ASSAM.

The timber is used for tea boxes.

Flrs. 3-6.

10. *Eugenia bifaria* Wall. Syn. *E. laurifolia* Roxb.

A tree; all parts glabrous. *Leaves* 2-4 by 8-2 in., elliptic, sub-acute or shortly blunt acuminate, entire, membranous or chartaceous; lateral nerves slender, 8-12 on either side of the channelled midrib, meeting in two intra-marginal nerves, the first .15-.2 in. from, and the second close and parallel to, the margin; petiole about .2 in. long, channelled. *Cymes* lax, usually branched, trichotomous or corymbose, axillary or terminal, few flowered, up to 3 in. long; peduncles and pedicels slender, the latter up to .7 in. long. *Flowers* about .5 in. across, white; calyx-tube .5-.6 in. long, obconic with conspicuous raised glands, narrowed to a slender basal portion; calyx-lobes obtuse, continuous with the limb. *Petals* orbicular, prominent, gland dotted. *Berry* .8-1 in. long, ovoid or ellipsoid, yellow, crowned by the inflexed calyx-lobes.

KHASI HILLS—*Wallich*, *Brandis*.

11. *Eugenia grandis* Wight. Vern. *Manmahui* (a name apparently used for many species of *Eugenia*) Kuki; *Moiyalong*, Tipp.; *Jam*, Syl.

A medium-sized to tall tree attaining in favourable situations 100 ft. in height and about 8 ft. in girth, sometimes with buttressed stems; branchlets terete, with close horizontal wrinkles, lenticellate; bark about .5 in. thick, greyish brown or grey, outer layers soft and peeling in thin corky-flakes; blaze reddish-brown. *Leaves* 5.5-8 by 2.7-5.7

in., broadly elliptic to ovate elliptic or suborbicular, rarely elliptic-lanceolate, abruptly short and blunt acuminate or apiculate; thickly coriaceous, shining; lateral nerves usually 12-20 on either side with conspicuous intermediate between, sub-parallel, joined by a wavy intramarginal nerve, often with another slender and rather obscure nerve near the margin; base acute, cuneate or nearly rounded; petiole .6-.8 in. long, stout. *Inflorescence* of dense corymbose stout peduncled panicles of cymes with stout branches, usually 3-5.5 in., terminal or from upper axils, often fascicled. *Flowers* white, 4-merous, sessile, about .6 in. across. *Calyx tube* .3-.4 in. long, turbinate, abruptly narrowed to the cylindric pedicel-like base of the calyx-tube; calyx-lobes in unequal pairs, larger, about .2 in. across, whitish, broadly orbicular; petals about .25 in. long, free; filaments long. *Berry* ovoid, obovoid or nearly subglobose, 1-1.5 in. long, crowned by the calyx-limb.

CACHAR, SYLHET, KHASI AND JAINTIA HILLS on the SYLHET slope, upto 1,000 ft.

Wood reddish brown, hard; pores joined by fine wavy concentric lines, medullary rays fine, weight about 51 lbs. per c. ft., not used.

Flrs. 12-2. Fr. 5.

12. *Eugenia ramosissima* Wall. Cat. 3604.

A middle-sized tree with spreading crown. *Bark* grey, nearly smooth, thin; blaze ultimately chocolate brown. *Leaves* 3-4.5 by 1-1.9 in., oblong to elliptic-lanceolate, usually more or less abruptly, but rather bluntly acuminate; lateral nerves 8-10 on either side, slender, forming intramarginal loops, tertiaries indistinct, generally more or less transverse to the midrib and sub-parallel; base abruptly or gradually narrowed to the petiole; petiole .2-.3 in. long, channelled. *Cymes* usually terminal and compound, peduncled, 1-2.5 in. long. *Flowers* .6-.7 in. across, when fully open; pedicels .2-.4 in. long. *Calyx-tube* .4-.5 in. long, narrowly obconic—gradually narrowed to a slender base, which is jointed to the pedicel; calyx-lobes .15-.2 in. across, two slightly larger, gland punctate like the petals,

which are free and $\cdot 3\cdot 4$ in. across; stamens up to $\cdot 7$ in. long. *Fruit* not seen.

GARO HILLS, Sanitarium hill; Thlen-syryngum at the foot of KHASI HILLS; EAST SYLHET, Pandua, (Wall Catalogue 3,604.)

13. *Eugenia (Jambosa) anisopetala* Parker. Fedde Report. Spec. Nov. XXXI (1932). Vern. *Paharejam*, Cach.

A medium-sized tree, with pale brown, glabrous, 4-angled branchlets which are shortly winged at the angles. *Bark* grey, about $\cdot 25$ in. thick; blaze fibrous and light brown. *Leaves* $4\cdot 5\text{--}8\cdot 25$ by $2\cdot 2\text{--}7$ in., oblanceolate-oblong to narrow elliptic-oblong, short-acuminate, or subacute, sometimes slightly falcate, glabrous, shining above, midnerve impressed, under-surface pale; lateral nerves usually 15-22, prominent beneath, with several irregular intermediates; intramarginal nerve $\cdot 1\cdot 2$ in. from the margin, wavy; base rounded or subcordate; petiole fleshy, $\cdot 15\cdot 3$ in. long, *Cymes* few-flowered in terminal and axillary panicles, which are $2\cdot 5\text{--}5$ in. and often branched from near the base or fasciculate; panicle branches and peduncles angled. *Flowers* subsessile, white, about $\cdot 4$ in. across. *Calyx-tube* $\cdot 25\cdot 35$ in. long, broad, campanulate, narrowed to a pedicel like base, about $\cdot 25$ in. across; calyx-lobes 4, rounded, about $\cdot 1$ in. long, broader than long, subpersistent in fruit. *Petals* 8, free, 4 outer suborbicular, nearly $\cdot 2$ in. across, sparsely glandular punctate, crenulate, 4 inner slightly smaller, rather unequal. *Filaments* up to $\cdot 35$ in. long; style nearly $\cdot 37$ in. long. *Berry* $\cdot 6\cdot 8$ in. diameter, subglobose, 1-2 seeded, crowned by the inflexed calyx-lobes.

CACHAR, Loharband—Owden, Das! Aijal Road! N. E. FRONTIER—Kanjilal 3,236. (If the identification of the sheet is correct.)

Flrs. 11-12. Fr. 2 ripen 8?.

14. *Eugenia mangifolia* Wall. Catalogue 3619. Syn. *E. reticulata* Wight III.

A medium-sized tree. *Leaves* 3-5 by 1-2 in., oblong to ovate lanceolate or elliptic-oblong, gradually or suddenly

and somewhat bluntly acuminate, coriaceous, shining above; lateral nerves numerous, prominent, close with laxly reticulating tertiaries, intramarginal nerves close to the margin, slender, wavy; base usually cuneate; petiole $\cdot 3\text{--}\cdot 5$ in. long, channelled and margined. *Cymes* arranged in axillary and terminal usually fascicled panicles up to $2\cdot 5$ in. long, often branched close to the base. *Flowers* about $\cdot 6\text{--}\cdot 7$ in. across when fully open (including the stamens), sessile or subsessile. *Calyx* $\cdot 3\text{--}\cdot 4$ in. long, broadly obconical, tapering to the solid base; limb much produced above the ovary; lobes small, ovate-acute or sub-acute. *Petals* $\cdot 15$ in. across, free. *Fruit* not seen.

KHASI HILLS—Hooker and Thompson; *Griffith* 2378! SYLHET—*Wall. Cat.* 3619! *Mann*, BRAHMAPUTRA VALLEY, *Kurz*! NAGA HILLS, *Prain's collector*!

Flrs. 3-4.

***Eugenia inophylla* Roxb.**

A tree with straight trunk. *Leaves* $3\text{--}5$ by $1\cdot 5\text{--}2\cdot 5$ in., elliptic, elliptic-oblong or oblong-lanceolate, obtusely acuminate, coriaceous; lateral nerves wavy, close and subparallel, transverse to the midrib; petiole about $\cdot 25$ in. long. *Cymes* compound, terminal and from upper leaf axils—with stout long peduncles, arranged in spreading corymbose panicles, attaining 6 in. *Flowers* sessile, about $\cdot 4$ in. across. *Calyx* $\cdot 25\text{--}\cdot 3$ in. long, clavate-turbinate, narrowed to the solid base, obscurely 4-5 lobed. *Petals* 4-5, free. *Berries* pyriform.

SYLHET—Wallich; EAST BENGAL—*Griffith* No. 2579!

I have seen no specimen from our area at Calcutta herbarium. Differs from the preceding by its larger long peduncled panicles and more clavate calyx.

Flrs. 4-8.

***Eugenia lanceolaria* Roxb.**

A small tree. *Leaves* $3\text{--}4$ by $1\text{--}1\cdot 5$ in., lanceolate or oblanceolate, bluntly acuminate; base cuneate or attenuate, coriaceous; lateral nerves slender and somewhat indistinct, 10-13 on either side of the midrib, looping to form a slender intramarginal nerve close to the margin; petiole $\cdot 4\text{--}\cdot 6$ in. long. *Cymes* in short corymbose panicle, terminal or from upper leaf axils; pedicels $\cdot 2\text{--}\cdot 5$ in. long, thick. *Flowers* $\cdot 6$ in. across. *Calyx-tube* $\cdot 25\text{--}\cdot 4$ in. long, campanulate with a sub-hemispheric limb; base pedicel-like; lobes 4, unequal, larger pair $\cdot 1\text{--}\cdot 15$ in. across, broader than long, rounded. *Petals* orbicular, about $\cdot 25$ in. across. *Stamens* about $\cdot 5$ in. long; style exceeding

the stamens. *Berry* "irregularly round, lobate, size of small apple, not eaten"—Roxb. in F. B. I. *Flora Indica*.

"SYLHET"—Roxburgh.

There is only sheet in Calcutta without fruit from Travancore (Bourdillon) under this name. This closely resembles some of the sheets named *E. hemispherica*. According to Roxb. the flowers are "very large, rosy and somewhat fragrant." The flowers in the Calcutta sheet are decidedly smaller than in the illustration in Wight Ic. t. 613.

Flrs. 5. Fr. 12.

15. *Eugenia cymosa* Lam. Vern. *Mui-sentel*, Tipp.; *Pani-jam*, Ass.

A middle-sized to large tree (large shrub according to F.B.I.), old stems often buttressed at the base. *Bark* thin, greyish; blaze ultimately turning reddish-brown. *Leaves* 2.3-5 by .7-1.7 in., elliptic to lanceolate or ovate-lanceolate, obtusely long acuminate or caudate, cuneate or acute, coriaceous, glabrous, shining above; lateral nerves very slender, numerous, indistinct above, distinct beneath, close, subparallel, joining in a fine wavy intramarginal nerve close to the margin; petiole .2-.3 in. long. *Cymes* peduncled, arranged in terminal or axillary subcorymbose panicles, with spreading branches on the axils of minute triangular bracts. *Flowers* white, small, about .25 in. across, usually sessile; bracteoles minute, resembling bracts. *Calyx-tube* .15 in. long, upper portion broad, campanulate, narrowed to the pedicel-like solid base, which is nearly as long; lobes 4, unequal, minute, broader pair rounded. *Petals* 4, small, orbicular, white, free. *Berry* .25-.3 in. across, globose, crowned by the calyx-limb.

SYLHET, N. CACHAR HILLS, SIBSAGAR—Barpathar, Deroi Reserve.

The wood is used for posts, etc.

Flrs. 10-12.

Var. *rostrata*. Leaves long acuminate; lateral nerves prominent on both surfaces; petiole usually larger than in the type; calyx truncate.

CACHAR, if Assam herbarium sheet No. 10916, has been correctly named.

16. *Eugenia saligna* (Miq.) Robinson incl. *E. acuminatissima* Kurz. *E. Cumingiana* Vedal. Vern. *Muijol-ong*, Tipp.

A tree with brownish grey thin bark and reddish-brown blaze, all parts glabrous. *Leaves* 3-6 by 1·2-2 in., lanceolate to oblong-lanceolate, caudate-acuminate, coriaceous, shining above; lateral nerves slender, often irregularly anastomosing, intramarginal nerve close to the margin; base cuneate or attenuated to the petiole; petiole ·2·3 in. long. *Cymes* in lax terminal and axillary, sometimes fascicled panicles up to ·3 in. long, with angular, spreading, opposite branches. *Flowers* sessile, small, ·2 in. across, white. *Calyx* ·12 in. long, hemispheric-turbinate, narrowed to a pedicel-like base; limb almost truncate at the top or with 5 very short lobes. *Petals* 5-6, free, suborbicular, about ·1 in. long; anthers didymous. *Fruit* ·5 in. across, globose, depressed at both ends, red to black when ripe, acid, deep red inside.

SYLHET—Longai reserve.

Fr. 12-1.

In the Index Kewensis *E. Thumra* Roxb. has been made synonymous with *E. acuminatissima* Kurz and given precedence over the latter. I have carefully compared the sheets included under these names in Calcutta herbarium, and find that there is no justification for the combination, as they represent two very distinct species.

The name given by Kurz to the Indo-Malayan sheets is however untenable as it had been given to a Brazilian species before he adopted it. C. B. Robinson has compared the Java and Calcutta sheets named *E. acuminatissima* with the Phillipine plant named *E. Cumingiana* by Vedal (1885) and with Miquels' *Jambosa saligna* (1858) and has been unable to separate them. He has therefore transferred the earliest specific name *saligna* to *Eugenia* according to International Rules of nomenclature, and has called the species *E. saligna* (Miq.) Rob. which appears to be the correct name for the plant hitherto known as *E. acuminatissima* Kurz.

I am much indebted to Mr. V. Narayanswami of the Botanical Survey of India for a critical note on the species.

17. *Eugenia prætermissa* Gage. Indian Forester Vol. XXXII, p. 6.

A moderate sized tree with greyish white bark; young branches terete. *Leaves* opposite, 2·7 by 1·2·5 in., lanceo-

late, elliptic-lanceolate or sometimes oblanceolate, somewhat bluntly and often abruptly acuminate; coriaceous, glabrous, shining above; lateral nerves close, numerous, very slender, sub-parallel, intramarginal nerve slender, wavy, often with a second rather faint nerve close to the margin; base cuneate; petiole $\cdot 3\text{--}\cdot 5$ in. long; cymes 2-3 flowered, arranged in somewhat lax, sub-corymbose, axillary and terminal panicles up to $4\cdot 5$ in. long. *Flowers* sessile or sub-sessile, $\cdot 25\text{--}\cdot 3$ in. across. *Calyx* about $\cdot 2$ in. long, broadly campanulate, narrowed to the pedicel-like basal portion. *Calyx-lobes* 4, broadly triangular, slightly inflexed, nearly $\cdot 1$ in. broad at the base. *Petals* 4, white, free, sub-orbicular, about $\cdot 15$ in. long, dotted; stamens about $\cdot 3$ in. long. *Fruit* about $\cdot 5$ by $\cdot 3$ in., ovoid, crowned by the calyx-limb, black when ripe.

SIBSAGAR—Jamuguri; S. LUSHAI HILLS—Gage; KHASI HILLS, Griffith. The fruit is edible.

Flrs. 11-12. Fr. 4.

18. *Eugenia claviflora* Roxb. Vern. *Bor-srem*, *Chambu*, *Chambu* or *Sambu-sirsang*, Garo.

A small to medium-sized handsome tree with grey or brownish nearly smooth bark, all parts quite glabrous. *Leaves* $2\cdot 7\text{--}6$ by $\cdot 7\text{--}2$ in., oblong-lanceolate to lanceolate or elliptic-oblong, acuminate, coriaceous; lateral nerves slender, numerous, intramarginal nerve slender; base acute or cuneate; petiole $\cdot 2\text{--}\cdot 3$ in. long. *Flowers* sessile, about $\cdot 4$ in. across; buds clavate. *Cymes* usually axillary or sometimes from axils of fallen leaves, compact, with short axis, often branched and fascicled; calyx-tube $\cdot 5\text{--}\cdot 7$ in. long, cylindrical, tapering to the pedicel-like base; limb expanded, $\cdot 15\text{--}\cdot 25$ in. across; lobes 4-5, very small, broad and rounded or sub-acute. *Petals* 4-5, free, about $\cdot 15\text{--}\cdot 2$ in. across, orbicular; stamens $\cdot 6$ in. long. *Berry* bluish black when ripe, $\cdot 7\text{--}1\cdot 5$ by $\cdot 5$ in., ovoid-oblong, crowned at the apex by the produced and more or less truncate calyx-limb and the incurved calyx-lobes.

GARO HILLS, KHASI HILLS—2,400 ft.—*Hooker and Thompson!*
GOALPARA—Saral-bhanga.

The fruit is said to be edible. In some forms many of the leaves are narrowly lanceolate.

Flrs. 3-4. Fr. 5.

19. *Eugenia tetragona* Wight. Vern. *Dieng-soh-um-kynthai*, *Dieng-soh-thiang-um*, Kh.; *Dieng-soh-sarlei*, Synt.; *Jongmi-supin-um-arong*, Cach.

A medium sized or large evergreen glabrous tree. *Bark* grey to almost black, pale brown on branches, nearly smooth; blaze brown or reddish brown; branchlets stout, quadrangular, often margined. *Leaves* 4·5-9 by 1·5-3 in., oblanceolate or oblong-lanceolate to elliptic, shortly acuminate; dark-green, coriaceous, gland dots minute; lateral nerves prominent beneath, about 15-20 on either half, with intermediates between, joined by a distinct intramarginal nerve; base cuneate or acute; petiole stout, ·4-1 in. long. *Cymes* arranged in short sub-corymbose panicles up to 1·5 in. long, which are solitary or few together, from axils of fallen leaves or from lower leaf axils; panicles branches stout. *Buds* globose, about ·15 in. across; flowers polygamodioecious, scented, greenish white, small, about ·25 in. across, sessile; bracteoles minute. *Calyx* turbinate, about ·15 in. long; tube narrowed to the somewhat stout pedicel-like base; lobes minute or obscure, deciduous in fruit lined by the thin disk. *Petals* white, ·1·15 in. across, orbicular-obovate, broader than or as broad as long, falling off in a piece; filaments about ·15 in. long; style short, none in male flowers. *Fruit* globose, about ·25 in. long, red and black, crowned by the calyx-limb, 'edible'—Brandis.

KHASI AND JAINTIA HILLS, 3-5,500 ft.; CACHAR—Bhuban Hills.

A pair of deciduous acuminate bud scales are often present between the petioles of uppermost leaves.

Flrs. 7-12, according to elevation. Fr. 5.

Kanjilal's Sheet No. 4538 in Assam Herbarium from Serarim (KHASI HILLS) altitude 5,500 ft. has been referred to this species at Sibpur, but as it differs in several important characters from the plant described above it is doubtful if the sheet has been correctly named.

20. *Eugenia balsamea* Wight. Vern. *Thoiranguni*, *Thoiranguli*, *Joldubuli*, Ass.; *Bol-thibrong*, Garo; *Min-chal*, Lush.; *Dieng-soh-une*, Kh.

A large shrub or a small tree. *Bark* light grey—nearly white or greenish grey; branchlets whitish. *Leaves* 3·5-7 by 1·2-2·7 in., elliptic-lanceolate to obovate-lanceolate, shortly acuminate or apiculate; sub-coriaceous, glabrous; midrib and lateral nerves prominent beneath, the latter 10-12, sometimes 14 on either side, meeting in a wavy intramarginal nerve, a second somewhat indistinct nerve close to the margin; base cuneate, narrowed to the petiole; petiole ·2-·4 in. long. *Cymes* in sub-corymbose panicles, ·8-2·5 in. long, usually from the axils of fallen leaves, rarely axillary, often fascicled; panicle branches brachiate. *Flowers* sessile, very small. *Calyx* about ·1 in. long, base of calyx-tube solid, pedicel-like; limb turbinate-truncate. *Petals* 4, usually calyptrate, sometimes nearly free. *Berry* globose, about ·2 in. across, red or black when ripe, crowned by the calyx-limb.

Recorded from all Districts except NOWGONG, where it also probably occurs, ascending to low elevations in KHASI HILLS.

Flrs. 10-11. Fr. 3.

Var. *angustifolia* F. B. I. Leaves up to 9 in. long, narrowly lanceolate or oblong-lanceolate, long acuminate, ·5-1·2 in. broad; petiole much shorter than the type—up to ·2 in. long.

Low elevations in KHASI HILLS, CACHAR, Prazer!

21. *Eugenia operculata* Roxb. Vern. *Bol-rujol*, *Thot-kak*, Garo; *Mokra-jam*, Jharua; *Godhajam*, Ass.; *Sumuk-arong*, *Thengpi-botepbhang*, Cach.

A moderate to medium-sized evergreen tree, all parts glabrous. *Bark* about 1 in. thick, pale brown or grey, rough, exfoliating in irregular hard plates; branchlets more or less compressed. *Leaves* 3-8 by 1·7-4 in., elliptic or obovate, obtusely acuminate, apiculate or rounded at the apex, glabrous, sub-coriaceous; lateral nerves 8-12 on either side, the upper joining in loops near the margin; tertiaries laxly reticulate; petiole ·5-1 in. long. *Flowers* ·25 in.

across, greenish-white, sessile. *Cymes* arranged in corymbose lateral panicles, 2-6 in. long, with trichotomous spreading branches from leafless nodes below the current year's shoot. *Calyx* .2 in. long, campanulate, gland dotted, limb with 4 short obtuse deciduous lobes. *Petals* white, sub-orbicular, calyptrate; connective of anthers with deciduous apical glands. *Berry* .3-.5 in. long, globose or ovoid with a truncated tip.

Common in all plains forests—except in the N. E. FRONTIER.

The leaves have a pleasant aromatic smell when bruised and turn red before falling. The fruit is said to be edible. The wood is greyish red or brown, close grained; heart wood not distinct. It could be used for agricultural implements.

Flrs. 4-5. Fr. 6-7.

Var. *Paniala* F. B. I. Leaves acute; berries oval, larger than in the type.

SYLHET—Wallich!

22. *Eugenia Jambolana* Lam. *E. Cumini* Linn. *Druce*. *Sizygium Jambolanum* DC. Vern. *Jambu*, Sans.; *Jamum*, Hind.; *Kala-jam*, Beng.; *Lal-shabaj-jam*, *Kur-kuri-jam*, *Boro-jam*, Beng. (Sylh.); *Thing-seng-tel*, *Ramui*, Tipp.; *Khorjam*, Mech.; *Sambu*, *Chambi*, *Khimkhol*, *Chambu-dalgappa*, Garo; *Kothia-jam*; *Kutai* or *Katahi-jamuk*, *Lohajam*, *Barjamuk*, Ass.; *Jambu-shi*, Cach.; *Kosoi*, *Jharua*; *Dieng-soh-thang-um*, *Dieng-ramai*, Kh.; *Jonkeng-asing*, Abor; *Jam-asing*, Miri; *Jangmi-arong*, *Ren-reng-arong*, Mikir.

A large evergreen tree. *Bark* rather thick, light grey or brown, somewhat rough with cracks and pits in old stem; inner substance fibrous, reddish brown; branchlets pale. *Leaves* variable in size and shape, usually 2.6-6 by 1.3-3.5 in., elliptic-oblong or ovate, acuminate, acute or sub-obtuse, narrowed—often abruptly to the base, smooth, glossy when young; lateral nerves close, very fine, meeting near the margin in an intramarginal nerve; petiole .3-1 in. long, channelled. *Flowers* greenish white, sessile, .25-.5 in. across, fragrant, usually in threes in brachiate panicles of compound cymes; lateral from leafless nodes below current year's shoots or rarely axillary or terminal. *Calyx* broad-turbinate, about

·15·2 in. long, with a truncate or very obscurely lobed limb and a pedicel-like solid basal portion. *Petals* dirty white, clayprate, suborbicular, dotted with large pellucid glands; anthers with minute apical glands. *Berry* variable in size and shape, usually up to 1 in. long—sometimes larger in cultivation—oblong or ellipsoid, often somewhat curved, black, juicy and shining when thoroughly ripe, usually crowned with the cup-like limb of the clayx-tube, purple inside; seed usually 1.

Throughout the area; often gregarious in swamps; often cultivated for fruits. In cultivation the leaves tend to become wider and larger.

The fruit is largely eaten, the juice is sometimes made into vinegar, which is considered very efficacious in dyspepsia, enlargement of spleen, etc. The seed is used in treatment of diabetes. The bark is a possible tanning material, and is also used in the preparation of astringent decoctions, gargles and washes. The wood is reddish grey, there is no distinct heartwood but the central portion is darker. It is coarse-grained, moderately hard and durable, and is specially suitable for use under water. It is used in many parts of India for buildings.

Flrs. 4-5. Fr. 6-7.

Var. *caryophyllifolia* Duthie. Syn. *Syzigium Jambolanum* Var. *microcarpum* Thwaites. Vern. *Khude-jam*, Beng.; *Kutai-januk*, *Kothia jam*, Ass.; *Jamuk-arong*, Mik.; *Ramoi-thing*, Kuki.

Leaves usually lanceolate, acuminate with cuneate base, smaller and narrower than in the type; panicles shorter and sometimes irregularly branched; calyx with 4 short lobes. *Berry* roundish, size of a pepper-corn or pea. It is usually a more branchy and smaller tree.

23. *Eugenia fruticosa* Roxb. Vern. *Dieng-cherumi*, Synt.; *Kathiya-jamuk*, Ass.

A shrub or a low branched tree; all parts glabrous. *Bark* grey or brownish-grey with minute vertical fissures. *Leaves* 2·5-5 by 1-2·2 in., elliptic, elliptic-oblong to oblong-lanceolate or gradually acuminate; base cuneate or acute, thinly coriaceous; lateral nerves slender, numerous, sub-parallel, intramarginal nerve wavy, slender; petiole ·3·6 in. long. *Cymes* paniced; panicles up to 3·5 in. long with brachiate, usually trichotomous, sharply 4-angled branches. *Flowers* small, sessile; bracteoles minute; calyx about ·1 in. long, turbinate, gradually narrowed to the base; limb

truncate or very obscurely 4-lobed. *Petals* white, calyptrate, sometimes free. *Berry* .2-.3 in. long, globose or ellipsoid.

SIBSAGAR, NOWGONG, N. CACHAR HILLS, KHASI AND JAINTIA HILLS—ascending to 3,000 ft.

Very closely resembles small fruited varieties of *E. Jambolana*.

Flrs. 3-4. Fr. 5-6.

24. *Eugenia khasyana* Duthie. Vern. *Kosoi*, Jharua.

A middle-sized spreading tree; branchlets terete. *Leaves* 3-5 by .7-1.5 in., lanceolate or acuminate, attenuate or cuneate at the base, thinly coriaceous; lateral nerves numerous, slender, tertiaries laxly reticulate; petiole .25-.7 in. long, channelled. *Cymes* paniced; panicles mostly axillary or terminal, shorter than the leaves; panicle branches angular, opposite, spreading. *Flower-buds* pyriform, .15 in. long. *Flowers* about .25 in. across; pedicels 0 or very short; calyx with a short solid base, and spreading truncate or obscurely toothed limb. *Petals* 4, calyptrate, rarely free. "*Fruit* cylindric, .25 in. long, crowned by the cup-shaped limb"—Brandis.

GARO HILLS—Dalu, Northern Range; KHASI HILLS—Hooker and Thompson, Griffith 2383! Thariaghat—Clarke!

Flrs. 10-11.

25. *Eugenia oblata* Roxb. Vern. *Chhambu-akhompha*, Garo; *Mirchube*, Mik.; *Ir-mui-thing*, Kuki; *Jambu-phang*, *Jambusi-phang*, Cach.; *Dieng-sa-rumi*, Synt.

A medium-sized tree, all parts glabrous. *Bark* brownish to ashy-grey or nearly white-thin, smoothish; blaze reddish brown; branches terete; branchlets and petioles often reddish. *Leaves* 3-6 by 1.2-2.2 in., elliptic-lanceolate or oblong-lanceolate, acuminate; base cuneate or acute, coriaceous, pink when young, dark green and shining above, when mature, gland dots distinct, small; lateral nerves numerous, slender, meeting in a slender intramarginal nerve close to the margin; petiole .2-.3 in. long. *Cymes* corymbosely paniced or trichotomously compound with angular branches, up to 3.5 in. long, terminal or from upper axils.

Flowers white, scented, sessile or very shortly pedicelled, .5 in. across, when fully expanded; buds clavate, about .3 in. long. *Calyx-tube* .25 in. long, with a solid pedicel like narrowed base; limb expanded, free portion nearly hemispheric; lobes 4 or 5, unequal, short, persistent. *Petals* usually calyptrate; calyptra about .2 in. across; stamens white, .3-.5 in. long, connective minutely apiculate above the anthers. *Berry* .5 in. across, globose.

Recorded from all Districts except SYLHET, where it also probably occurs; extending to lower elevations in the KHASI, GARO and N. CACHAR HILLS.

Flrs. 1-4.

26. *Eugenia cuneata* Wall. Vern. *Lari*, Sylh.; *Dieng-soh-saw*, *um-kynthei*, Kh.

A shrub or a small tree with brownish grey bark; all parts glabrous. *Leaves* 1.5-2.7 by .5-.7 in., narrowly lanceolate-oblong-lanceolate or elliptic-lanceolate, shortly acuminate, sub-acute or obtuse; base acute or cuneate, thinly coriaceous; lateral nerves numerous, slender, sub-parallel, intramarginal nerve close to the margin, indistinct; petiole .2-.25 in. long. *Cymes* compound, sub-corymbose or trichotomous, terminal or from upper axils, upto 3.5 in. long. *Flowers* small, about .25 in. across, sessile or with very short pedicels. *Calyx* .2-.25 in. long, turbinate; limb truncate, narrowed to a pedicel like base. *Petals* calyptrate. *Berries* globose or ellipsoid, .35-.5 in. long, black when ripe, crowned by the calyx-limb.

SYLHET—edges of rocky streams; KHASI HILLS, ascending to 5,500 ft.

Flrs. 10-11. Fr. 12.

***Eugenia cyanophylla* Kanjilal et Das.** Nov. sp.

A shrub attaining about 12 ft. in height with grey branchlets. *Leaves* 1.5-3.5 by .3-.75 in., narrowly oblong-lanceolate or lanceolate, subacute, margins recurved, gradually tapering to the petiole, glabrous, coriaceous; secondary nerves fine, rather indistinct and comparatively distant with secondaries between intramarginal nerve close to the margins; petiole very short, about .12 in. long, channelled. *Cymes*

terminal, shortly peduncled, usually corymbose on a short axis, .4-.6 in. long. *Flowers* .6-.8 in. long, subsessile. *Hypanthium* clavate; lower portion solid; calyx-limb narrow, campanulate, .25-.3 in. long, produced above the ovary; calyx segments 5, broader than long, .05-.1 in. across, gland punctate. *Petals* 8, in two series, outer broader, .1-.12 in. by about .1 in., inner narrower and unequal, glandular. *Stamens* unequal, upto .4 in. long, smallest about .2 in. long, in several series, infolded in bud. *Ovary* 2-celled; style subulate, exserted, .53-.4 in.; ovules numerous. *Fruit* not seen.

Assam Herbarium, Sheet No. 601P and 6786. Dehing bank-elevation about (460 metres) 1,500 ft.—N. CACHAR HILLS.

The leaves dry on the upper surface a beautiful prussian blue from which it is easy to distinguish from all other *Eugenias*.

Flrs. 1.

***Eugenia grata* Wall. Cat. 3585.**

A small tree. *Leaves* 2.5-5 by .7-2 in., oblong-lanceolate, ovate-lanceolate or elliptic-lanceolate, acuminate, rounded or cuneate at the base, coriaceous, upper surface punctate; lateral nerves slender, 15-20 on either side, indistinct above, intramarginal nerve close to the margin; petiole .1-.25 in. long, channelled. *Inflorescence* terminal and axillary of dense clusters of cymes racemously arranged on a common axis, 1.5-4 in. long, the whole often forming a leafy panicle; peduncles of cymes 0-.3 in. long. *Flowers* sessile; calyx-tube narrowly campanulate with an attenuate pedicel-like base about .3 in. long; lobes 5, very small, broad-ovate, broader than long. *Petals* 5, orbicular, about .1 in. across, free. *Stamens* about .2 in. long; style about .3 in. long. *Fruit* ellipsoid or ovoid, .3 in. long, on a short stalk, crowned by the calyx-limb, 1 seeded.

ASSAM—*Jenkins*; KHASI Mts.—*Griffith*. There are no sheets in herbarium—Calcutta from the area of the Flora.

In some of the sheets in Calcutta herbarium from Burma Shaik Mokim 343 also Curtis No. 756 from Penang, the cyme peduncles are borne in the axils of caducous spathulate or oblanceolate membranous bracts, .2 in. long and the flowers are borne in the axils of similar bracteoles, .15 in. long.

27. *Eugenia bracteata* Roxb. Vern. *Misi-ia-thep*, *Lukluki-jam*, Cach.; *Reng-reng-kung*, *Ingnar-arong-kong-arong*, Mik.; *Minsentel*, Tipp.; *Harch*, Nep.; *Thing-senti*, Kuki.

A small to moderate-sized tree (in our area*). *Young* parts and inflorescence rusty or fuscous silky villous. *Bark* thin, pale-brown, almost white to light grey, finely fissured. *Leaves* 1.5-4 by .7-2 in., oblong-lanceolate to elliptic,

* In most (*vide* Haines Botany of Bihar) parts of India it is only a shrub.

sub-rhomboid or oblanceolate, bluntly acuminate; base cuneate, thinly coriaceous, closely gland-dotted, glabrous or pubescent or puberulous along the midrib beneath, nerves faint, slender, about 10-14 on either side, intra-marginal nerve wavy; petiole about .2 in. long. *Peduncles* up to .5 in. long, 1-flowered, axillary or extra-axillary, fascicled or solitary, and often opposite, sometimes apparently terminal being crowded on new shoots with undeveloped leaves; bracteoles small, linear, deciduous, a pair at the base of the calyx. *Flowers* about .4 in. across, handsome, white. *Calyx* about .15 in. long, rusty pubescent outside, basal portion hemispheric; limb dilated; disk pubescent; calyx-lobes broadly oblong or sub-orbicular, reflexed after flowering. *Petals* about .15 in. long, orbicular, pubescent outside, margins ciliate. *Berry* .25 in. across, orange or red, globose, crowned by the persistent calyx-lobes.

N. E. FRONTIER-Dist. SIBSAGAR, NOWGONG, CACHAR, SYLHET, KHASI HILLS—near the foot on the SYLHET slopes. Probably in other Districts also. Grown in many parts of India as an ornamental plant, its myrtle like flowers adding to its beauty.

The fruit is said to be edible. The wood is reddish or purplish brown, fairly close grained and capable of taking a good polish. It is used for tool handles, posts and pestles for pounding rice.

Flrs. 1-5—according to Haines—Flrs. and Fr. all the year round.

Eugenia Mooniana Wight. Vern. *Sonapati-jam*, *Muisentel*, Ass.

A small (or middle-sized?) tree; all parts glabrous. *Leaves* very variable in size and shape, 1.5-2.5 by .7-1.25 in., lanceolate, ovate or elliptic, acuminate; base cuneate or acute or rounded, thinly coriaceous, nerves inconspicuous; lateral nerves many, intramarginal nerve close to the margin; petiole .2-.25 in. long. *Flowers* white, about .25 in. across, solitary or fasciculate; pedicels filiform, about .5 in. long, axillary or from old wood; bracteoles small, lanceolate, subulate. *Calyx* .15 in. long, pubescent outside; calyx-tube not produced beyond the ovary; lobes 4, lanceolate or oblong. *Petals* 4, longer than the calyx-lobes, free. *Fruit* .5-.7 in. long, scarlet or crimson, globose.

Sheet No. 4927 from Longai reserve in leaf only—has been referred to this species with which it agrees in foliage but more material is necessary for confirmation of the record. Our specimen attains a girth of 6 ft. but *E. Mooniana* is described as a shrub or a small tree by Brandis (Ind. Trees, p. 326); a shrub by Cooke (Flora of

the Bombay Presidency, p. 494), and a small tree by Gamble (Madras Flora, p. 484).

Flrs. 2-3.

Eugenia aborensis Dunn. Kew Bulletin 1920. XV., p. 109 Vern. *Pankalasing*, Abor.

A middle-sized glabrous tree, about 25 ft. high; bark whitish, fibrous, brown inside. *Leaves* sub-sessile, 5·5-9 in. by 1·2-2 in., oblong-lanceolate, acuminate, membranous, gland punctate; lateral nerves many, about 20-25 on either side, slender, prominent beneath, intramarginal nerve wavy, ·1-·2 in. from the margin with another faint one between; base narrowed, cordate and often amplexicaul. *Cymes* few flowered, terminal and axillary from axils of fallen leaves, sometimes fascicled. *Flowers* about ·8 in. across; pedicels and calyx-tube rusty puberulous; pedicels ·2-·5 in. long, slender. *Calyx* broad, turbinate or campanulate, ·3-·35 in. across, rugose with raised glands, narrowed to a pedicel like base; lobes broad, ovate, ·2 in. across, broader than long. *Petals* 5, rotundate, about ·25 in. across; stamens ·35 in. long; style about ·5 in. *Immature fruit* globose, about ·5 in. long, crowned by the incurved calyx-lobes.

ABOR HILLS about 2,000 ft.; N. E. FRONTIER—between Pasi-ghat and Pillung.

Flrs. 12-1.

DECASPERMUM Forst.

Decaspermum paniculatum Kurz. Syn. *Nelitris paniculata* Lindl. Vern. *Dieng-auro-la-pyrno*, *Dieng-la-phynia*, Synt.

A small tree with rough brown or grey bark, exfoliating in thin pieces; young parts and inflorescence covered with adpressed silvery or greyish white silky-hairs. *Leaves* 1·5-4 by ·5-1 in., lanceolate, oblong-lanceolate or ovate lanceolate, cuspidate-acuminate; base gradually or abruptly narrowed to the petiole, thinly coriaceous, closely pellucid-dotted, dark glossy green above, paler and pubescent or puberulous on the midrib beneath, nerves indistinct, intramarginal nerve close to the margin; petiole ·1-·2 in. long, silky. *Flowers* white, ·3-·4 in. across, polygamous, in terminal and axillary panicles of cymes, about 2·5 in. long or sometimes in simple peduncled cymes; bracts leaf-like, lanceolate to subulate, upto ·5 in. long, smaller upwards; bracteoles minute, linear at the top of the pedicels, which

are slender and up to .25 in. long. *Calyx* .1 in. long; calyx-tube usually densely clothed with white or greyish adpressed hairs, adnate to the ovary, limb usually 5-lobed, persistent, broadly acute, less hairy than the calyx-tube; lobes broadly ovate or sub-orbicular, broadly acute or obtuse. *Petals* white, up to .2 in. long, ciliate, gland dotted. *Stamens* numerous, in several series; filaments filiform; anthers versatile. *Ovary* usually 4-celled, inferior, with 2-ovules in each cell; style exserted; stigma peltate. *Berry* globose, about .15 in. across, crowned by the persistent calyx-lobes; seeds few, reniform; testa hard.

KHASI HILLS.

Flrs. 7. Fr. 11.

EUCALYPTUS L' Herit.

Ever-green glabrous trees, sometimes attaining gigantic size, usually secreting red aromatic gum. *Leaves* gland dotted, entire, with an intramarginal nerve, in young plants opposite, horizontal, usually sessile, later on usually alternate, different in shape, petiolate, vertical, more or less falcate and coriaceous. *Flowers* bisexual, usually on axillary peduncles, in umbels or heads of 3-many or sometimes solitary; pedicels not jointed; calyx-tube turbinate or campanulate, adnate to the base of the ovary and continued beyond it, usually truncate at the apex; the orifice of the calyx-tube closed in bud, by a cap consisting of the united petals, which falls off by the pressure of growing stamens. *Stamens* numerous in many rows, infolded in bud. *Ovary* inferior, 3-6 celled; ovules numerous, axile; style undivided; stigma small. *Fruit* a hardened capsule, opening at the top by 3-6 valves; seeds numerous, minute, angular, cuneate, a large percentage sterile, these being smaller than the fertile ones.

Calyx-tube not angled or rugose, .15 in. across,
not produced beyond the ovary. Flowers in
umbels.

1. *E. teretecornis*.

Calyx-tube angled and rugose, .6 in. across,
produced beyond the ovary. Flowers 1-3
together in leaf axils.

2. *E. globulus*.

1. *Eucalyptus teretecornis* Sm. Forest red gum.

A large tree with long branches and an open crown. *Bark* smooth, ash coloured. *Leaves* 4-9 by $\cdot 6\text{--}1\cdot 5$ in., usually falcate, few, ovate-lanceolate, juvenile leaves ovate, coriaceous, narrowed to the stout petiole, which is $\cdot 5\text{--}1\cdot 5$ in. long; nerves slender, somewhat indistinct. *Umbels* 4-9 flowered, axillary, simple or paniced; common peduncle stout, $\cdot 5\text{--}1$ in. long; pedicels short, stout; buds about $\cdot 5$ in. long. *Calyx-tube* turbinate, $\cdot 15$ in. across; operculum conical, longer than the calyx-tube, about $\cdot 3$ in. long; filaments about $\cdot 3$ in. long; anthers opening by slits. *Capsules* about $\cdot 2$ in. across; valves prominently exserted.

Cultivated in Shillong, where it succeeds fairly well.

2. *Eucalyptus globulus* Labill. Blue Gum.

A lofty aromatic tree; young shoots and foliage glaucous-grey or bluish. *Bark* peeling off in long strips, which persist for a long time, exposing a smooth surface underneath. *Leaves* 6-10 by $\cdot 7\text{--}1\cdot 5$ in., falcate, linear to narrow-lanceolate, abruptly narrowed at the base to the rather stout petiole, punctate with black dots, nerves slender but distinct; juvenile leaves ovate, nearly sessile; petioles up to $1\cdot 5$ in. long, broader upwards. *Flowers* large, 1-3 together in leaf axils; pedicels angled, very short. *Calyx-tube* covered with a whitish grey bloom, warty and angular, about $\cdot 5$ in. long, $\cdot 6\text{--}\cdot 8$ in. across, rim produced beyond the ovary; operculum low, abruptly pointed, rugose. *Stamens* about $\cdot 6$ in. long; anthers opening by slits. *Capsules* $\cdot 7\text{--}1$ in. across; valves exserted.

Frequently cultivated in Shillong, where its growth is fast and attains large dimensions.

Flrs. 10. Fr. 12-1.

Eucalyptus maculata Hook. (Syn. *E. citriodora*). Lemon-scented gum.

A tree with bark smooth, whitish or slightly greyish. *Leaves* 4-7 in. long; lanceolate, often somewhat falcate, bright green. *Flowers* usually in 3-flowered umbels, arranged in panicles; operculum hemispheric. *Stamens* opening by slits. *Fruits* ovoid, about $\cdot 5$ by $\cdot 4$ in.

LUSHAI HILLS, cultivated. Gives a lemon scent when the leaves are bruised.

Wood strong, tough, elastic, liable to warp (Troup).

Flrs. and Fr. 1-3.

A few other species of *Eucalyptus* are also cultivated in gardens, but they are not of sufficient importance for inclusion.

Callistemon linearis DC. Vern. The bottle brush tree.

A small aromatic evergreen tree with rough fissured bark and drooping branches; young parts covered with soft spreading hairs. *Leaves* alternate, 1·7-3·2 by ·15-·25 in., linear-lanceolate, sharply pointed, narrowed at the base, coriaceous, glabrous with age, closely gland dotted, intramarginal nerve conspicuous; petiole very short. *Flowers* crimson, in terminal leaf bearing spikes; bracts linear. *Calyx* ·2 in. long, campanulate, hairy; lobes 5. obtuse. *Petals* 5, suborbicular; stamens numerous, long exserted, ·5-·7 in. long. *Ovary* 3-4 celled; ovules numerous. *Fruit* capsular, woody, with a truncate apex, about ·2 in. long.

Often cultivated.

Flrs. 3-12.

Psidium Guyava Linn. The Guava. Vern. *Sophri*, *Sophriam*, (Sylh.); *Paiṛa*, Beng.; *Madhuram*, Ass.; *Amrua*, Hind.; *Shu-khren*, Cach.; *Choupri*, Kuki; *Soh-pyriam*, Kh.

A large small evergreen or sub-deciduous tree with smooth pinkish brown bark exfoliating in thin flakes. *Leaves* opposite, 2·5-6 in. long, oblong or elliptic oblong, entire, glabrous above, pubescent beneath, faintly aromatic and pellucid dotted; lateral nerves prominent; petiole up to ·3 in. long. *Flowers* 1-1·5 in. across, white on 1-3 flowered axillary peduncles; calyx urceolate, lower portion adnate to the ovary, upper portion free and irregularly lobed. *Petals* free. *Berry* globose or pyriform, varying in size and shape, ordinarily about 2·5 in. in length, containing numerous seeds, immersed in a pleasantly flavoured sweet pulp.

Largely grown in gardens, sometimes found as an escape.

Flrs. and Fr. almost throughout the year but flrs. mainly hot season and fr. rainy and cold season.

FAM. 58. LECYTHIDACEÆ.

Trees. *Leaves* alternate, usually crowded at the ends of branchlets, exstipulate, entire or shortly toothed, without oil glands. *Flowers* solitary, in racemes or spikes, hermaphrodite. *Calyx-tube* adnate to the ovary; lobes 4-6, rarely 2-3, valvate or imbricate. *Petals* 4-6, rarely 0 or more. *Stamens* many, in several series; filaments more or less connate at the base, and sometimes arranged on one side of the flower; anthers sometimes wanting or some of the stamens modified to staminodes. *Ovary* inferior, 2-6, rarely more-celled, usually many ovuled; style long, slender; stigma capitate. *Fruit* a woody fleshy or fibrous berry with 1-many seeds; seed exalbuminous.

Flowers in short spikes. Fruit globose, many-seeded; stamens some without anthers. ..

1. **Careya.**

Flowers in pendulous racemes. Fruit angular, 1-seeded; stamens all perfect. ..

2. **Barringtonia.**

1. CAREYA Roxb.

Careya arborea Roxb. Vern. *Kumbhi*, Sans.; *Kumbhi*, Beng., Hin. and Ass.; *Waiduphang*, *Bon-appi*, *Bon-iaphi*, Cach.; *Loring*, Mik.; *Khum*, Mech; *Soh-kyndur*, *Ka-mahir*, Kh.; *Panibhela*, (Darrang), *Godhajam*, *Kum*, *Kumrenga*, *Kumari*, Ass.; *Gambel*, *Bol-dimbel*, Garo; *Thing-poi*, Kuki, *Bhola-changne*; Daff.

A moderate to medium-sized deciduous tree. *Bark* dark grey or brown, thick, fibrous, exfoliating in narrow flakes, brownish-red inside. *Leaves* alternate, 6-12 by 3-7 in., obovate or oblanceolate, shortly acuminate or obtuse; base narrowed to a short margined petiole, crenulate-denticulate, glabrous, thin; lateral nerves 10-15, looping near the margins. *Flowers* 2.5-4 in. across, with an unpleasant smell, white and pink in few flowered stiff terminal spikes; bracts 3, unequal, central elliptic, 2 lateral linear. *Calyx* about 1 in. long; calyx-tube campanulate, not produced beyond the ovary; lobes 4, a little shorter than the tube, rounded, stiff. *Petals* 4, white, caducous,

about 2 in. long, imbricate, elliptic. *Stamens* numerous in several series; filaments up to 3 in. long; gradually longer outwards, those of the innermost and outermost series without anthers. *Ovary* inferior, usually 4-celled with an annular disk at the top; ovules numerous, in 2 series on axile placentæ; style long, stiff. *Berry* 2·5-3 in. across, globose or ovoid, crowned with the limb of the calyx-tube; seeds numerous, up to 4 in. long, immersed in pulp.

SYLHET, CACHAR, GOALPARA, GARO HILLS, NOWGONG, DARRANG, KHASI HILLS up to about 2,500 ft.

Sapwood large, whitish, nearwood reddish, even grained. medullary rays fine, numerous, uniform. The timber is durable, stands well under water and takes a good polish. It is mainly used for oars and tool handles in this province, weight about 50 lbs. per c. ft. It could be used for planking, cart furniture and cabinet work. The bark, flowers, juice and fruit are considered medicinal.

Flrs. 4-5. Fr. 7. Leaves turn red or purple before falling.

2. BARRINGTONIA Forst.

Barringtonia acutangula Gært. Vern. *Ijul*, Sans.; *Hinsol*, Sylh. & Ass.; *Hijal*, Sylh.; *Hinyol*, *Pani-amra Bheh*, Ass.; *Chin-chong-arong*, Mik.

A small to medium-sized tree. *Bark* dark grey to almost black, longitudinal, but reticulate furrowed, 5-1 in. thick, inner substance light pinkish, soft. *Leaves* 3-6 by 1·3 to 3·3 in., alternate, crowded at the ends or branches, obovate or oblanceolate, apex rounded or subacute, minutely denticulate, thinly coriaceous, glabrous; lateral nerves distinct, 8-13 on either half, curved near the margin; tertiaries reticulate; base narrowed; petiole up to 25 in. long, margined. *Flowers* about 5 in. across, deep red, delicately fragrant, in slender, drooping, glabrous racemes 6-18 in. long. *Pedicels* 1-15 in. long; bracts oblong; bracteoles lanceolate, both caducous. *Calyx-tube* funnel-shaped, not produced beyond the ovary; lobes 4, rounded, equalling the tube, minutely denticulate. *Petals* 4, about 2 in. long, adnate to the base of the staminal tube, imbricate, falling off early along with the stamens in one piece. *Stamens* in several series, red, connate below; filaments dilated at the base. Disk annular, epigynous, within the staminal tube. *Ovary* inferior, 2-celled, with 2 pendulous ovules in each cell; style filiform.

Fruit about 1·5 in. long, oblong, bluntly quadrangular, crowned with the persistent calyx lobes, somewhat narrowed and truncate at both ends, fibrous, 1-seeded.

Throughout ASSAM ascending to 2,500 ft., usually on banks of streams, edges of swamps, and moist places.

Wood pale or reddish brown, soft, medullary rays broad and very broad, numerous, no distinct heartwood—but fairly tough and durable. It is considered suitable for cabinet making, boat building, wells, carts, etc. Wt.—about 40 lbs. per c. ft.

The bark is used for intoxicating fish.

The cotyledons are rudimentary and the embryo and seedlings have swollen hypocotyl.

Flrs. 3-6. Fr. 9-10. Flowering and fruiting also in the cold weather—R. N. De.

Couroupita guianensis Aubl. The cannon ball tree.

A tree with pubescent young parts. *Leaves* 6-9·5 by 2·2-3·2 in., oblanceolate or obovate-lanceolate, shortly acuminate, thin, glabrescent above, thinly pubescent beneath; lateral nerves 18-20 on either side, looped near the margin. *Flowers* large, showy; pinkish, about 3·5-5 in. across, from old wood. *Calyx* lobes rounded. *Petals* 6, obovate subequal, 1·5-2 in. long, connate at the base with the staminal tube. *Fertile* stamens borne on an outgrowth of the tube, which is bent over the staminode bearing tube; filaments of fertile flowers dilated, up to ¼ in. long. *Fruit* large, woody, globose (whence the English name) with an extremely unpleasant smell when ripe.

Cultivated, e.g., Gauhati.

The timber is said to be good.

Flrs. 7. Fr. 1-2.

FAM. 59. MELASTOMACEÆ.

Herbs or shrubs, rarely trees or climbers. *Leaves* exstipulate, opposite or whorled, generally petioled, entire or nearly so, often 3-7 nerved from or from near the base, which approximate near the apex, rarely penninerved (Memecylon). *Inflorescence* various. *Flowers* regular, hermaphrodite, often showy. *Calyx-tube* tubular or campanulate, partially (often by septa like vertical walls) or entirely adnate to the ovary and more or less prolonged beyond it, rarely free; limb

usually 4-5 (rarely 3 or 6) lobed, sometimes truncate, rarely falling off as a cap. *Petals* as many as calyx lobes, contorted in bud. *Stamens* as many to twice as many as the petals, and inserted with them on the edge of the calyx-tube; alternate stamens sometimes shorter, sometimes rudimentary; filaments inflexed in bud, often geniculate; anthers 2-celled, usually opening by pores, rarely by longitudinal slits; connective often appendaged at the base. *Ovary* usually 4-5, sometimes 3-6 celled (1 celled in *Memecylon*); style simple, filiform, rarely short; ovules many (except in *Memecylon*); placentæ usually axile (free central in *Memecylon*). *Fruit* included in the calyx-tube, baccate or capsular, breaking up irregularly or by pores through the top of the cells. *Seeds* minute, many (1 in *Memecylon*), albumen 0.

- I. Leaves with 3 or more prominent basal nerves; ovary 4-5 celled; seeds numerous :—
 - A. *Petals* 4-5 :—
 1. *Stamens* twice as many as petals :—
 - a. Apical portion of ovary bristly harshly hairy or scaly; seeds curved through half a circle :—

Stamens equal; capsule opening at the apex by pores. . .	1. Osbeckia.
Stamens unequal; fruit bursting irregularly. . .	2. Melastoma.
 - b. Apical portion of ovary glabrous; seeds more or less straight or sub-falcate :—
 - i. Fruit capsular :—

Stamens unequal; fruit 8-ribbed. . .	3. Oxyspora.
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 - ii. Fruit baccate :—

Stamens equal. . .	4. Medinilla.
Stamens unequal. . .	5. Anplectrum.
 2. *Stamens* as many as petals; flrs. small. 6. **Blastus.**
 - B. *Petals* 3. *Stamens* equal. 7. **Sonerila.**
- II. Leaves penninerved without prominent basal nerves; ovary 1-celled, few ovuled; seed usually 1. 7. **Memecylon.**

1. OSBECKIA Linn.

Hairy herbs or shrubs, commonly with 4 angled branchlets. *Leaves* opposite or ternate. *Flowers* 4-5 merous,

terminal in capitate cymes or in panicles, sometimes solitary. *Calyx-tube* with stellate hairs or pectinate scales outside. adnate to the lower half of the ovary; segments and usually part of the limb deciduous. *Stamens* 8-10, equal or unequal; anthers oblong, which may be more or less beaked, connective not produced at the base, slightly swollen or with 2 tubercles. *Ovary* 4-5 celled, setose at the apex; ovules numerous on the placentæ radiating from the axis. *Capsule* opening by 4-5 pores from the free top. *Seeds* numerous, curved through half a circle, pitted.

I. Flowers 4 merous :—

A. Flowers panicled; shrubs 3-5 ft.:—

Calyx-tube with dense tufts of stellate hairs. much branched shrubs.

1. *O. crinita*.

Calyx-tube glabrous or with few hairs usually stem undivided.

2. *O. rostrata*.

B. Flowers capitate; perennial herbs or undershrubs up to 2 ft. high :—

Erect, leaves linear oblong-lanceolate; bracts glabrous or nearly so. . .

3. *O. chinensis*.

Diffuse branching from near the base; leaves broad ovate, adpressed pubescent.

O. capitata.

II. Flowers 5 merous :—

4-5 ft. high. Flowers usually white, not nodding, in compound cymes; calyx with bristle fringed scales. Leaves over .5 in. broad.

4. *O. nepalensis*.

2-3 ft. high. Flowers usually mauve, nodding solitary or few together; calyx glabrous or nearly so; leaves under .5 in. broad, linear or narrow lanceolate.

5. *O. nutans*.

1. *Osbeckia crinita* Benth. Vern. *Ja-lang-kthem*. *Dieng-soh-kthem*, Khasi.

A small much branched shrub ordinarily attaining about 5 ft., but sometimes taller; branches covered with spreading bulb based fuscous hairs. *Leaves* 2-4 by .9-1.5 in., ovate to oblong-lanceolate, acuminate, rounded to subcordate, sometimes narrowed at the base, clothed on both surfaces with harsh adpressed hairs, 5-7 nerved; tertiaries fine, sub-parallel; petiole .2-.5 in. long. *Flowers* purple (according to C. B.

Clarke—sometimes pure white), about 1.25 in. across, 4 (rarely 5) merous, in corymbs of cymes; pedicels up to .25 in. long; bracts ovate or suborbicular, densely hairy on the back or sometimes glabrate with a dense fringe of hairs along the margin. *Calyx* .4 in. long with stiff stellate hairs; sometimes borne on minute, linear scales, upper portion of limb deciduous along with petals and stamens, a truncate fruiting calyx persisting; lobes subulate, usually alternating with linear scales, often pectinate with bristles and crowned by stellate bristles. *Petals* obovate, about .6 in. long; stamens 8; anthers large, produced into long incurved beaks; base of the connective tubercled. *Bristles* on the apex of the ovary 18-20. *Fruit* including the neck .5 in. (.75 in. according to F.B.I.) long, suddenly narrowed to a neck; fruiting calyx ultimately hairless, free portion about equalling, narrower than the fruit.

KHASI HILLS 4-6,000 ft.

Flrs. 7-10. Fr. 11-1.

Osbeckia septeminervia Ham. in notes of the Royal Botanic Garden Edin. Vol. X (1917), p. 55.

Branchlets quadrangular, hirsute with spreading hairs. *Leaves* 3-5 by .8-1.3 in., lanceolate to oblong-lanceolate, gradually attenuated to the acute apex, chartaceous, thinly adpressed hirsute above, pale and with long hairs on the nerves; base 7 nerved; petiole .3-.45 in. long, densely hairy. *Cymes* axillary or terminal and paniced, densely covered with harsh hairs; bracts sub-rotundate to ovate, often acuminate, .25-.35 in. long, dorsally adpressed setose, glabrous within, margin long ciliate. *Calyx* segments 4, linear-lanceolate, subacuminate or long acuminate, .5-.6 in. long, sparsely clothed with long setose and whitish adpressed short hairs, margins setose-ciliate; hairs never glandular. *Petals* 4, about 1 in. by .8 in., obovate to orbicular-ovate, more or less shortly clawed, ciliate. *Stamens* up to 1.5 in. long; anthers slightly longer than filaments. *Ovary* included; style up to 1.2 in. long.

Allied to *O. crinita* from which it differs mainly by its large flowers.

GOALPARA—Hamilton.

2. **Osbeckia rostrata** Don. Vern. *Phutki*, Assamese.

An erect almost unbranched shrub attaining 5 ft.; stem herbaceous, nearly glabrous or with scattered bristly ascending hairs. *Leaves* opposite or sometimes ternate, 3-8

by 1·2·5 in., lanceolate to ovate-lanceolate or elliptic-oblong, acuminate, subcordate, rounded or narrowed at the base; thin, almost glabrous to strigose, specially along the nerves, basal nerves 5, sometimes 7; petiole ·12·6 in. long. *Flowers* about 1·5 in. across, 4 merous, rose purple, in long paniced cymes; pedicels quadrangular, 0·1 in.; bracts ·25 in. long, ovate-ciliate, glabrous or hairy along the nerves on the back. *Calyx* ·6·8 in. long, glabrous or with scattered bristles or rarely stellate hairs; lobes ·25·4 in. long, lanceolate or elliptic-lanceolate, ciliate, alternating with subulate, usually bristle pectinate processes and deciduous along with the rim of the calyx-limb. *Petals* ·6·8 in. long, usually more or less ciliate. *Anthers* 8 with long incurved beaks; base of the connective tubercled. *Ovary* without or with short bristles at the top. *Fruits* ·5·8 in. long, narrowed into a long cylindric neck. *Fruiting calyx* glabrous or nearly so, rarely with scattered stellate hairs; free portion of calyx as long as or longer and narrowed than the fruit, truncate at the apex. Very variable as regards hairiness.

In swampy ground all over the province ascending to 4,500 ft. in the KHASI HILLS.

Flrs. 7-9, Fr. 10-12.

Var. *pulchella* Benth. Stem glabrous, 4-angled. *Leaves* lanceolate or ovate lanceolate, glabrous or slightly strigose on the nerves specially on the outermost; petioles long, scales between the calyx lobes glabrous, obscure or absent. *Fruits* large, ·7·8 in. long; seeds buff.

GOALPARA; Mamloo—K. & J. HILLS—probably all over the Province.

3. *Osbeckia chinensis* Linn.

A weak erect undershrub attaining up to 2 ft. in height, branches pubescent with ascending adpressed hairs. *Leaves* 1-2 in. by ·2·5 in., oblong to linear-lanceolate; base narrowed, 3-5 nerved, adpressed pubescent on both surfaces; petiole 0 to very short. *Flowers* capitate at the ends of the branches, mauve or purple, 1 in. across, 4-merous; bracts ·2·25 in. long, elliptic or ovate ciliate, glabrous on the back. *Calyx* ·5 in. long. *Calyx-tube* glabrous; lobes lanceolate, ciliate, alternating with scales tipped with long spreading bristles, deciduous with the rim of the limb.

Petals about .5 in. long. *Stamens* 8; anthers long beaked; ovary with about 16 erect bristles at the top. *Fruit* about .25 in. long; fruiting calyx .2 in. across with a short neck, glabrous.

Common specially on the hills ascending to 5,000 ft. in the KHASI HILLS.

Flrs. 7-11.

Osbeckia capitata Benth. Vern. *Soh-pythem*, Khasi.

A perennial herb attaining about 20 in. in length, branches from near the base; branches weak, 4 angled, strigose with ascending adpressed bulb-based bristly hairs. *Leaves* .5-1 by .3-.5 in., subsessile, ovate to elliptic ovate, with a broad or subcordate, 3-5 nerved; (up to 9 nerved according to F.B.I.), base adpressed pubescent on both surfaces. *Flowers* .8-1 in. across, pinkish purple, capitate on the ends of branches, sometimes on short peduncles from upper axils. *Bracts* .2-.25 in. long, ovate, acute, adpressed pubescent, ciliate. *Calyx* .5 in. long, glabrous; lobes lanceolate, ciliate, alternating with minute bristle fringed scales, deciduous along with the rim of the limb. *Petals* about .5 in. long with a few cilia at the apex; anthers with a long beak. *Ovary* with 16-20 bristles at the apex. *Fruit* .3 in. long, .2 in. across with a short neck. *Fruiting calyx* glabrous.

KHASI HILLS 4,000—6,000 ft. Very common in forest undergrowth and in grass.

Flrs. 6-10. Fr. 11.

4. Osbeckia nepalensis Hk. f.

A small shrub attaining about 5 ft. in height with sharply 4 angular, sometimes shortly winged stem and branches, covered with adpressed ascending stiff hairs. *Leaves* 2.5-5.5 by .7-1.7 in., oblong-lanceolate to lanceolate, broadly acute to shortly acuminate; base broadly cordate to rounded, 5 nerved, pubescent on both surfaces with rather harsh hairs; petiole very short upto .1 in. long. *Flowers* white (or mauve according to C. B. Clarke), 5 merous, about 1.5 in. across in compound corymbose cymes, terminal and sometimes from upper axils; cymes compact; pedicels upto .1 in. long, stout; bracts .5 in. long, ovate or elliptic,

scarious, ciliate along the margins, villous along the centre of the back and the base glabrous elsewhere. *Calyx* with persistent scales fringed with bristles, of which 5 alternate with the lobes; rim of the calyx-tube deciduous; lobes .4 in. long, broadly lanceolate, glabrous, ciliate along the margins. *Petals* about .7 in. long, broadly obovate, usually with a few cilia at the apex. *Stamens* 10; filaments dilated in the middle; apex constricted and crowned by a rim formed by the dilated base of the connective, anthers attenuated to a pointed tip (not beaked). *Free portion* of the ovary strigose and with a ring of bristles on the 5 crenate crown. *Fruit* about .5 by .3 in., free portion of fruiting calyx very short; apex of the capsule slightly protruding beyond the rim.

Almost all over ASSAM, ascending to 4,500 ft. in the KHASI HILLS.

Flrs. mainly 4-11.

5. *Osbeckia nutans* Wall.

A small much branched shrub about 2-3 ft. high with wiry, strigose branches. *Leaves* 2.2 by .15-.45 in., narrow or linear-lanceolate, 3 nerved, very prettily lineolate along nervules above (when dry), and glabrous and pale or sometimes golden yellow beneath between the strigose main nerves and margins. *Flowers* usually 5-merous, sometimes 4-merous (Kanjilal's Sheet No. 7450 in Assam Herbarium), rose purple, about 1 in. across, 1-3 together on short terminal and axillary peduncles; pedicels strigose, nodding up to with a line of adpressed bristles along the centre of the back, otherwise glabrous. *Calyx* .5 in. long, glabrous or with few caducous bristles; lobes lanceolate, .3 in. long, ciliate and with minute bristle-fringed scales in between, deciduous along with the rim of the calyx-limb. *Petals* .4-.5 in. long, with few cilia at the apex. *Stamens* twice as many as the petals; filaments dilated in the middle, connective ending in a rim; anthers attenuate. *Free part* of the ovary persistently strigose. *Fruit* .2 in. long, about .2 in. across, top extruded from the hemispheric fruiting calyx.

GOALPARA, probably extending along the Sub-Himalayan Tracts to DARRANG and KAMRUP.

Flrs. 10-12. Fr. 11-1.

2. MELASTOMA Linn.

Strigose or villous shrubs. *Leaves* 3-7 nerved, *Flowers* 5 (rarely 6-7 merous). *Calyx-tube* with simple hairs or scales; lobes deciduous. *Stamens* twice as many as the petals, alternate ones long with purple anthers and connective produced at base and terminating in two lobes, the remaining shorter ones with yellow anthers, connective not produced but with two tubercles in front. *Ovary* as in *Osbeckia*. *Fruit* coriaceous or somewhat baccate, bursting irregularly. *Seeds* numerous, curved through half a circle, minutely punctate.

Young parts rather rough; stem adpressed scaly, not shaggy, upper surface of leaves thinly pubescent with hairs adpressed for their entire lengths; buds usually completely enclosed within the bracts; calyx lobes glabrous inside.

1. *M. malabathricum*.

Young parts silky; stems shaggy, upper surface of leaves more or less densely adpressed pubescent; hairs free at one end; bracts usually not enclosing the buds; calyx lobes generally more or less hairy.

2. *M. normale*.

1. *Melastoma malabathricum* Linn. Vern. *Khakkhi*, *Khakkhu*, *Bol-khakhu*, *Khakhuchi*, Garo; *Tokle-gach*, Jharua; *Phutuka*, *Phutkala*, *Phutki*, Ass.; *Khusemphan*, Kach., *Bit-bit-arong*, Mik.; *Leidum*, *Mulkong*, Kuki; *Murkong*, Tipp.; *Syntew-soh-pyandang*, *Ka-dieng-kum*, *Dieng-soh-khing*, Kh.; *Phutuli*, Sylh.; *Thung-khu*, Mech.

A handsome bushy shrub attaining up to 15 ft. in height; young parts densely adpressed bristly; stem and petioles strigose with long and subulate to short echinate scales. *Leaves* 2.5-5 by .7-2 in., oblong-lanceolate, lanceolate or elliptic, acuminate, scabrous with hairs adpressed for their entire lengths above, undersurface scaly strigose on main nerves and harshly adpressed pubescent or bristly on the tertiary nerves and on the space between basal nerves 3-5; petiole .2-1 in. long, scaly strigose. *Flowers* mauve-purple, 1.5-3 in. across, usually in clusters of 1-5 at the ends of branchlets; bracts .4-.75 in. long, enclosing the buds, elliptic or obovate, obtuse or acute, narrowed into a broad stalk, adpressed scaly outside; pedicels up to .3 in. long, stout,

clothed with serrulate scales. *Calyx* .6-.75 in. long. *Calyx-tube* densely covered with pale brown, linear acuminate, and usually serrulate scales; calyx-lobes lanceolate, .25-.35 in. long, deciduous, thinly pilose outside, glabrous with a few hairs towards the apex within. *Petals* .7-1.25 in. long. *Fruit* about .25 in. across, truncate, rather pulpy inside with fleshy purple placentæ and breaking up transversely outside.

Throughout the area ascending to 5,000 ft. in the KHASI HILLS. Sometimes gregarious in waste lands.

The fruits are eaten and the leaves are applied over cuts to stop bleeding.

Flrs. 2-7. Fr. 11-12—probably all the year round.

2. *Melastoma normale* Don Vern. *Ja-long-kythem-heh*, *Dieng-slidong*, *Dieng-soh-klong*, Khasi.

An erect shrub attaining about 15 ft. in height; branches densely shaggy with spreading hairs, usually with subulate bristles at the nodes; young shoots fuscous, silky villous. *Leaves* 2.5-5 by 1-2 in., oblong-lanceolate to ovate-lanceolate, shortly acuminate or acute; base 3-7 nerved, pubescent above with long adpressed hairs, free at one end, undersurface pubescent or villous, midrib and often the main nerves with subulate serrulate scales; petiole .25-.8 in. long, with bristly hairs and scales. *Flowers* rose purple, about 2 in. across, 3-10 together in terminal clusters, sometimes a few from upper axils; pedicels up to .4 in. long, densely clothed with adpressed acuminate serrulate scales like the calyx; bracts caducous, ovate acuminate to linear-lanceolate, up to .5 in. long, not enclosing the buds, villous outside. *Calyx* .5-.75 in. long; lobes .2-.3 in. long, less densely pubescent than the calyx-tube outside, more or less pubescent inside. *Fruit* as in the last species.

Difficult to distinctly distinguish from the last species of which it is not improbably a variety. It is more softly pubescent and generally more hairy than the last species but I have seen forms intermediate in hairiness between the two species.

KHASI HILLS 2-5,000 ft.

Flrs. and Fr. most of the year, mainly 5-1.

Melastoma imbricatum Wall Cat.—Branches, petiole, peduncles and calyx covered with adpressed serrulate scales. *Leaves* 4-9 in. long, broad elliptic, strigose on both surfaces; nerves on the undersurface with adpressed scales. *Flowers* in terminal clusters, about 1.25 in. across. *Fruit* .3-.6 in. long, ovoid, the margin at the top somewhat dilated.

ASSAM, KHASI HILLS—Brandis. I have seen no specimens of the species from our area.

Pleroma macaranthum D. Don.—A shrub or a small tree; branchlets, petiole and axis of inflorescence clothed with soft spreading hairs; young parts silky, villous. *Leaves* 3-5 by 1.2-2.2 in., elliptic to lanceolate-acuminate or acute, 5-7 nerved, softly hairy on both surfaces, more densely beneath; petioles .3-.5 in. long. *Flowers* 3-3.5 in. across, purplish-blue, very showy, sessile or nearly so in compound cymes from ends of branches or upper leaf axils; bracts about 1 in. long, somewhat harshly pubescent outside, red with age enclosing the buds, caducous. *Calyx* adpressed pubescent; calyx-tube .5 in. long; lobes 5, oblong-lanceolate, as long as the tube or slightly longer, deciduous, glabrous inside, often bordered with red on the margins. *Petals* 5, broadly obovate, about 1.5 in. long. *Stamens* 10, 5 long and 5 short; filaments declinate, glandular hairy except at the top; anthers bluish purple, narrowed at apex, connective produced at the base, 2-tubercled. *Ovary* 5 celled; ovules numerous on radiating placentæ.

A native of Tropical America. Cultivated in Shillong, where apparently the fruit does not ripen. Very handsome striking when in flower.

Flrs. 7-11.

3. OXYSPORA DC.

Large spreading shrubs with drooping branches. *Leaves* long petioled, large, 5-7 nerved, secondary nerves parallel. *Flowers* in long terminal panicles with decussate branches; bracts very small. *Calyx-tube* cylindric, turbinate; teeth 4, short, triangular. *Petals* 4, sub-acute. *Stamens* 8, 4 with long filaments and purple, the others yellow; anthers narrowed upwards, opening by single apical pore. *Ovary* inferior, 4-celled; apex glabrous; style simple, elongate; ovules numerous on radiating axile placentæ. *Capsule* fusiform, dry, 8 ribbed. *Seeds* numerous, minute, often falcate.

1. Not glabrous; connectives of shorter anthers at least spurred :—

Young parts with spreading hairs,
larger anthers shortly lobed, connectives of all spurred.

.. .. 1. *O. vagans*.

Young parts tomentose with fugacious stellate scurf, also with soft deciduous bristles; larger anthers deeply lobed, connective of shorter anthers spurred; of larger anthers with minute protuberance. 2. *O. paniculata*.

II. All parts glabrous, connective of anthers not spurred. 3. *O. cernua*.

1. *Oxyspora vagans* Wall. Vern. *Sinka-asing, Jogirmigjir*, Abor; *Dieng-soh-ladoukhlaw*, Synt.; *Tew-soh-kthem*, Kh.

A moderate-sized shrub attaining about 4 ft. in height; branchlets, petioles, undersurface of leaves along the nerves clothed with spreading hairs. *Leaves* 3·5-7 by 1·7-3·7 in., those near the panicle very small, elliptic or ovate-lanceolate to suborbicular ovate or acuminate; base subcordate, 5-7 nerved, entire or shortly dentate, membranous, more or less ciliate along the margins, otherwise glabrate above; petioles up to 3 in. long, shorter upwards. *Panicles* stellate pubescent, branches ending in cymes. *Flowers* purplish red; pedicels short, slender; bracts up to ·2 in. long, linear-lanceolate or spathulate. *Calyx* ·25 in. long, stellate pubescent with a constricted neck; teeth acute, distant. *Petals* ·25 in. long, shortly acuminate. *Base* of longer anthers shortly 2 lobed, connectives spurred. *Capsule* about ·3 in. long, narrowed and produced to the base, crowned by the enlarged limb of the calyx-tube. *Seeds* minute, truncate at the apex, falcate or sub-falcate with two sharp-points bent at right angles in front and back, the former usually shorter, dark-coloured and continuous with a lateral ridge-(raphe).

N. E. FRONTIER, SIBSAGAR, KHASI HILLS up to 3,500 ft.
Flrs. 10-11. Fr. 2.

2. *Oxyspora paniculata* DC. Vern. *Lang-tang*, Khasi.

A shrub attaining 8 ft. in height; young shoots and petioles with dense fugacious, stellate scurf and soft spreading bristles, undersurface of leaves, inflorescence and calyx outside, thinly stellate, scurfy. *Leaves* 5-9 by 2·5-6 in.,

elliptic-broad or suborbicular-ovate, acuminate; base subcordate and 5-7 nerved, denticulate, membranous, nearly glabrate above; petiole up to 3 in. long with a tuft of bristly hairs at the top. *Panicles* copious, branches ending in cymes. *Flowers* with purple pedicels, calyx and petals; pedicels slender, short. *Calyx* .4 in. long, teeth triangular, acute. *Petals* .3 in. long, ovate, apex, acuminate and slightly pubescent outside. *Longer* anthers deeply 2-cleft at the base, connectives with minute protuberance. shorter anthers not 2-cleft at the base but the connective spurred. *Capsule* about .4 in. long, crowned by the accrescent calyx limb; seeds minute, falcate or nearly so with a truncate apex with 2 unequal beaks at either end, the one on the back long, the other short and continuous with the lateral ridge (raphe).

LAKHIMPUR, KHASI HILLS up to 4,500 ft.

Flrs. and Fr. most of the year, mainly 7-3?

3. *Oxyspora cernua* Triana.

A straggling evergreen glabrous shrub (scandent according to Kurz and Brandis), attaining about 12 ft. with long drooping branches, affecting rocky localities. *Leaves* opposite, those of the same pairs often dissimilar in size and to some extent also in shape, uppermost passing into bracts. commonly 4-15 in. long, ovate-lanceolate, acuminate, 5-7 nerved and rounded or cordate at the base, subcoriaceous, dark green and shining above, paler or reddish-brown beneath (in dried state?); petiole .5-2 in. long. *Panicles* lax, up to 20 in. long; rachis sharply quadrangular at the base. *Bracts* and bracteoles persistent. *Flowers* rose coloured, on slender pedicels, .3-.5 in. long. *Calyx* about .4 in. long; lobes broadly ovate, acute. *Petals* .5 in. long, oblong, acute; anthers not spurred, those of the longer stamens slightly diverging at the base. *Capsule* .3-.4 in. long.

KHASI HILLS—Kurz, DAFFLA HILLS—King's Collector-Jamunamukh (ABOR HILLS), Burkhil, NAGA HILLS—Masters.

Flrs. 10-11 (Kurz). Fr. 2-3 (Do.).

4. MEDINILLA Gaud.

Branching shrubs or small trees, erect or scandent. *Leaves* opposite or whorled, entire, usually glabrous and 3-9 nerved from the base. *Flowers* somewhat fleshy in lateral or terminal paniced cymes, pink or white, 4 or 5, rarely 6-merous. *Calyx-limb* obscurely toothed or truncate. *Stamens* twice as many as petals, sub-equal, rarely unequal; anthers opening at the top by a single pore; base of the connective not or very shortly produced with two tubercles in the front and often a spur behind. *Ovary* inferior, 4-5, rarely 6-celled; apex glabrous; style filiform; ovules numerous; placentæ axile. *Berry* crowned by the limb of the calyx; seeds very many, ovoid or subfalcate, often with thickened raphe.

Cymes axillary; peduncles very short or 0. .. 1. *M. rubicunda*.
 Cymes usually terminal; peduncles long. .. 2. *M. himalayana*.

1. *Medinilla rubicunda* Bl. Vern. *Bogitenga*, Ass.; *Jajaotler*, Synt.

A shrub or small tree attaining 15 ft. *Branchlets* subterete, somewhat striated; young shoots minutely puberulous, beautifully pink. *Leaves* 2·5-5 by 1·2-3 in., elliptic to lanceolate, shortly rather bluntly acuminate: base narrowed, 3-5 nerved, the stronger pair arising ·2·5 in. above the base, pink when young, glabrous with age, minutely punctulate beneath, somewhat fleshy; petiole short, up to ·25 in. long. *Flowers* 4-merous, pink in glabrous very short peduncled cymes from axils of existing or fallen leaves; pedicels up to ·2 in. long, jointed towards the base with two minute bracteoles from the joint; buds with a conical apex. *Calyx* about ·2 in. long; teeth obscure, obtuse. *Petals* rose pink, ovate, ·2 in. long. *Stamens* 8, sub-equal, connective shortly produced at the base, spur very short. *Berry* ·12·2 in. across, black when ripe, ovoid or subglobose, the short persistent limb of the calyx broader than the narrowed apex; seeds covered with minute raised points, raphe not produced.

KHASI HILLS—3-5,000 ft.; LAKHIMPUR, Upper Dihing Reserve. The leaves are eaten cooked. The fruits though insipid are edible.

Flrs. 8-10. Fr. 1-2.

2. *Medinilla himalayana* Hk. f.

A glabrous shrub, sometimes sub-epiphytic. *Bark* pale-brown; branchlets striate. *Leaves* 2·5-4 by 1·1-1·7 in., elliptic to broadly elliptic, shortly and rather bluntly acuminate; basal nerves 3-5, stronger pair sub-basal; petiole almost 0·1 in. *Flowers* about ·6 in. across, rose, in terminal compound, peduncled cymes. *Peduncles* ·7-1·5 in. long; pedicels up to ·2 in. long, jointed and with a pair of minute bracteoles. *Calyx* about ·2 in. long; limb short; teeth obscure. *Petals* ·25 in. long, ovate. *Stamens* 8; anthers without spur. *Berry* ·3 in. across, spherical; seeds usually subfalcate covered with minute elevated points, raphe not extruded.

KHASI HILLS—5-6,000 ft.

Flrs. 7. Fr. 11.

5. ANPLECTRUM A. Gray.

Anplectrum assamicum C. B. Clarke. Vern. *Lota-phutkola*, Ass.

A shrub 8-10 ft. in height; stem, petiole, under surface of leaves along the main nerves and rachis of inflorescence clothed with spreading bristly hairs. *Leaves* opposite, 4·5-7·2 by 1·2-2·6 in., oblong-lanceolate or ovate oblong, sometimes elliptic-lanceolate, acuminate, minutely and distantly denticulate, ultimately nearly entire; base 3-5-nerved, subcordate, narrowed or rounded, often somewhat unequal, subcoriaceous, glabrous above; petiole very short up to ·15 in. long. *Flowers* 4-merous in pyramidal terminal panicles; branches opposite, ending in trichotomous cymes; bracteoles lanceolate to ovate, ciliate, ·2-·25 in. long; pedicels short up to ·2 in. long, pubescent. *Calyx* up to ·15 in. long, oblong, glabrous or nearly so with a long limb; teeth obscure, but accrescent. *Petals* 4, whitish, contorted in bud, ·25-·3 in. long, ovate with a bluntly pointed and bristle tipped apex. *Stamens* 8, inserted at the base of the limb; filaments 4, bearing long anthers and 4 with shorter anthers; anthers attenuated upwards and opening by one pore (?); connectives of long anthers ending in a cordate appendage, usually with auricled base, those

of short anthers acute with 2 rounded lateral lobes. *Ovary* adnate at the base only, free portion of ovary glabrous 4-celled with a fleshy axile peltate placenta in each, bearing numerous ovules; style subulate, .3 in. long. *Fruit* about .2 in. long, ovoid, baccate; seeds numerous, subfalcate with a dark-brown raphe and parallel lines of minute tubercles.

LAKHIMPUR—common between Gogaldubi and Dulongmukh—SIBSAGAR.

Flrs. 4-5. Fr. 12.

A little known species, the plant described above matches with sheets in Calcutta herbarium.

6. BLASTUS Lour.

Blastus cochinchinensis Lour. Vern. *Phutkala*, Ass.; *Bigbik*, Mik.

A shrub attaining 15 ft.; branches terete; young parts inflorescence and calyx outside densely covered with reddish brown or yellowish-white round scales. *Leaves* 3-5 by .7-1.5 in., oblong to elliptic lanceolate, acuminate, cuneate at the 3-5 nerved base, membranous, covered with minute scales beneath, sometimes also sparsely above; petiole .5-.75 in. long. *Flowers* 4-merous, very small, clustered on protuberances from the axils of existing or fallen leaves; pedicels about .1 in. long, elongating in fruit to about .25 in., slender; bracts 0. *Calyx* about .1 in. long; teeth short. *Petals* equal, much exceeding the calyx teeth. *Stamens* 4, equal; anthers attenuate at the top opening by a terminal pore, cells produced and 2-lobed at the base, connective not appendaged. *Ovary* 4-celled, pubescent at the apex; ovules many on axile placentæ. *Capsule* about .15 in. long, opening towards the summit by 4 slits. *Seeds* minute; testa produced into linear arms at either end.

LAKHIMPUR, SIBSAGAR—probably also in other districts.

Flrs. 1-2.

Sonerila maculata Roxb.—A small herb, stem with spreading hairs. *Leaves* opposite, 2-4 by 1.2-2.2 in., broadly ovate to lanceolate, serrulate and ciliate on the margins, with spreading hairs on both surfaces or nearly glabrous, membranous, penninerved; base often unequal; petiole 1-2 in. long, hairy. *Flowers* 3-merous, about .5 in. across, mauve, secund at the ends of peduncles, which are up to 3 in.

long. *Calyx* thinly hairy. *Petals* elliptic, acute. *Stamens* 3, equal, connective not appendaged. *Ovary* 3-celled, inferior. *Capsule* slightly angled, glabrous, about .25 in. long; seeds numerous, with a slightly excurrent lateral ridge (raphe).

KHASI HILLS—1-6,000 ft.

Flrs. 8-10.

7. MEMECYLON Linn.

Evergreen glabrous shrubs or trees. *Leaves* opposite, sessile or short petioled, coriaceous, penninerved, rarely 3 nerved; nerves inconspicuous. *Flowers* blue or white. tetramerous in simple or paniced often umbelliform cymes or compact sessile fascicles from axils of fallen or existing leaves, rarely terminal. *Bracteoles* 2 or more at or near the base of the pedicels. *Calyx* campanulate, glabrous, dilated and produced far above the ovary, truncate or shortly 4-lobed. *Stamens* 8, equal; filaments long; anthers short, opening by slits, connective thickened at the back and ending in a horn. *Ovary* inferior, 1-celled; apex glabrous, surmounted by disk, usually with 8 radiating grooves; style long, filiform; ovules usually 6-12, sometimes more on a free central placenta. *Fruit* a more or less fleshy globose or ellipsoid, 1, rarely 2-seeded berry crowned by the calyx limbs; cotyledons convolute, foliaceous.

Berry large usually .5 in. and over in length. . . . 1. *M. cerasiforme*.

Berry usually .25-.3 in. in length. . . . 2. *M. edule*.

1. *Memecylon cerasiforme* Kurz. Vern. *Kakoi-chera*, Ass.; *Pandauje*, Kach.; *Narakong*, Mik.

A small tree; bark grey with vertical fissures about .4 in. thick. *Leaves* 2.5-6.5 by 1.8-2.5 in., oblong to elliptic, acuminate at both ends, coriaceous, drying, greenish-yellow; lateral nerves faint, obscure; petiole short, up to .3 in. long, stout. *Flowers* not seen.* *Peduncle* of fruiting cyme .2-.7 in. long, axillary or from axils of fallen leaves; pedicels .2-.25 in. long. *Berries* .5-.6 in. long, broadly ovoid or subglobose, succulent, black when ripe.

* Flrs. 3-5. Fr. 6-9 since collected—R. N. De.

SIBSAGAR—Barpathar, Garampani, Noajan, etc.
Wood reddish brown, tough, used for axe handles.

Fr. 10-12.

Memecylon plebejum Kurz. Var. *silhetense* C. B. Clarke. Small tree up to 40 ft. in height. *Leaves* 1·5-3 by ·5-1·5 in., lanceolate or elliptic-lanceolate, acuminate, midrib prominent beneath; lateral nerves quite invisible; petiole ·12-·2 in. long. Flowers light blue; peduncles 0·12 in., clustered; inflorescence hardly exceeding ·5 in. *Calyx* at the time of flowering saucer-shaped, small disk on the apex of the ovary prominently rayed. *Berries* not seen.

SYLHET—Chhatak—Hk. f. and T.; CACHAR—Prazer.
An imperfectly known plant.

2. Memecylon edule Roxb. Var. *ovata* Clarke. Syn. *Memecylon edule* Roxb. (1995), *M. edule* Var. Thwaites. Vern. *Lali-dimabophang*, Kach.; *Theihadum*, Kuki & Tipp.

A small to moderate sized tree, attaining in favourable situations a height of 50 ft. *Bark* grey, corky with vertical furrows. *Leaves* 3-6 by 1·2-2·2 in., lanceolate-elliptic or ovate-acuminate; base acute, nearly rounded or cuneate; lateral nerves more or less indistinct; petiole ·2-·25 in. long. *Flowers* bright blue, ·25 in. across. *Cymes* umbellate, usually compound; peduncles 1-several together from the axils of fallen or less frequently existing leaves ·2-·4 in. long, elongating in fruit; pedicels ·2-·25 in. long. *Calyx* subrotate when expanded, often pinkish; limb truncate or with rounded obscure teeth. *Petals* 4, about ·1 in. long, blue, fugacious, broadly ovate. *Stamens* blue; filaments long, exserted. *Disk* with about 8 radiating lines usually joined a marginal one. *Berry* globose, ·25-·3 in. across, blue, 1-2 seeded.

SIBSAGAR, NOWGONG, SYLHET, CACHAR, GOALPARA, probably occurs in most districts in low elevations.

The ripe fruits are eaten. The wood is very hard and is said to be used for pestles.

Flrs. 3-6. Fr. 12-2(?).

Var. cuneata Thwaites (sp.) *Leaves* lanceolate or oblong, 2·5-4·2 by 1-2 in., shortly acuminate or obtuse, attenuate at the base to the very short petiole; fruit the size of a pea.

NOWGONG.

Var. *scutellata* Triana. incl. *M. punctatum Presel.*, and *M. scutellatum* Naud. ex Kurz For. Fl. I. 513. Small tree with corky reticulately furrowed dark-grey almost black bark. *Branchlets* with raised decurrent lines from the insertion of the petioles. *Leaves* 2-3 in. by 1·7 in., elliptic or ovate lanceolate, shortly blunt acuminate, subacute or obtuse at apex; base narrowed, punctate on both surfaces; petioles very short, 1·2 in. long. *Cymes* almost sessile or with very short peduncles. *Disk* rays prominent, of raised lines. *Petals* acute. *Berries* "size of a pea"—Kurz.

SIBSAGAR.

Memecylon elegans Kurz.

A small tree or shrub; bark dark grey to blackish, corky, reticulately deeply furrowed; branchlets more or less terete; young branchlets quadrangular or 4 winged. *Leaves* entire, ovate, oblong or elliptic, 1-3 in. by 5-1 in., coriaceous, narrowed into a short petiole; lateral nerves obscure. *Flowers* pinkish in bud (blue-Kurz) in lax cymes sometimes in pairs; peduncles longer than petiole. *Calyx* (free), wider than the ovary; tube truncate. *Disk* rayed. *Berry* small, spherical.

SIBSAGAR (Barpathar), 270 ft.

Flrs. 11. Fr. 5.

M. grande Retz. Var. *Horsfieldii* Miq. (sp.) cum Var. *khasiana* F. B. I. Syn. *M. celastrinum* Kurz. Vern. *Koyo-asing*, Miri and Abor.

A small tree. *Leaves* 2·5-5 by 1·3-2·2 in., elliptic-lanceolate, acuminate, often caudate; base acute or cuneate, secondary nerves first visible (in dry specimens?) beneath; petiole 2·25 in. long. *Peduncles* 2·1 in. long, compressed, 1-2 together on leaf axils, bearing cymose umbellules; pedicels 1·15 in. long. *Flowers* sky blue, small. *Calyx* about 1 in. long, cup-shaped, broadening afterwards, teeth minute, obscure or truncate. *Petals* 1 in. long, ovate, acute. *Disk* rays prominent. *Berries* 25-4 in. across, 1-seeded, crowned by the short calyx limb.

SIBSAGAR—Diphu Reserve; KHASI HILLS—Griffith; GARO HILLS—Sugiri Valley; DARRANG, N.-E. FRONTIER—Nizamghat.

Flrs. 5. Fr. 6.

The plant appears to be scarcely more than a variety of *M. edule*. The forms with larger fruit do not match with any sheets either at Calcutta or Dehra Dun and it is possible that two species have been included here, but this cannot be definitely ascertained till more material is available. In the Calcutta herbarium both var. *Horsfieldii*

and var. *khasyana* of *M. grande* have been grouped together under *M. celsastrinum* Kurz—by King.

Tibouchina semidecandra Cogn.—A shrub or a small tree; branchlets, petiole and axis of inflorescence clothed with soft spreading hairs; young parts silky, villous. *Leaves* 3-5 by 1.2-2.2 in., elliptic to lanceolate-acuminate or acute, 5-7 nerved, softly hairy on both surfaces, more densely beneath; petioles .3-.5 in. long. *Flowers* 3.3-5 in. across, purplish-blue, very showy, sessile or nearly so in compound cymes from ends of branches or upper leaf axils; bracts about 1 in. long, somewhat harshly pubescent outside, red with age enclosing the buds, caducous. *Calyx* adpressed pubescent; calyx tube .5 in. long; lobes 5, oblong-lanceolate, as long as the tube or slightly longer, deciduous, glabrous inside, often bordered with red on the margins. *Petals* 5, broadly obovate, about 1.5 in. long. *Stamens* 10, alternately short and long; filaments declinate, glandular hairy except at the top; anthers bluish purple, narrowed at apex, connective produced at the base, 2-tubercled. *Ovary* 5-celled; ovules numerous on radiating placentæ.

A native of Tropical America. Cultivated in Shillong, where apparently the fruit does not ripen. Very handsome when in flower.

Flrs. 7-11.

Sarcopyramis nepalensis Wall.

An erect glabrous herb; stem quadrangular, succulent. *Leaves* 2.3-5 in. long, ovate, long-acuminate, membranous; petiole .5-2 in. long, often longer; base 3-nerved. *Stamens* 8, equal; style filiform. *Capsules* open by 4 valves crowned with four large scales. *Seeds* numerous.

KHASI HILLS—46,000 ft.

Flrs. and Fr. 9-12.

FAM. 60. LYTHRACEÆ.

Trees, shrubs or herbs often with quadrangular branches. *Leaves* entire, opposite, sometimes whorled, rarely alternate; stipules 0. *Inflorescence* various, often cymose or paniced. *Flowers* 2-sexual, rarely unisexual (*Crypteronia*). *Calyx-tube* usually free, persistent; lobes 3-6, often with few accessory teeth, valvate. *Petals* as many as calyx teeth,

often crumpled and imbricate in bud, rarely 0, inserted on the top of the calyx tube. *Stamens* inflexed in bud, very many or definite, inserted on the calyx tube. *Ovary* free, rarely inferior; style usually long; stigma capitate, rarely 2-lobed; ovules numerous, usually on axile rarely parietal placentæ. *Fruit* dehiscent or not, free or adnate to the base of the calyx, 2-6 celled or 1-celled by the absorption of the dissepiments. *Seeds* many, sometimes winged, albumen 0.

I. Petals present; flowers bisexual :—

A. Calyx tube not coloured, leaves not gland dotted :—

Flowers 6-merous; seeds winged. 1. **Lagerstrœmia.**

Flowers 4-8-merous; seeds minute, tailed at either end. .. 2. **Duabanga.**

B. Calyx tube scarlet; leaves dotted with black glands :—

Flowers zygomorphic, calyx tube tubular. .. 3. **Woodfordia.**

II. Petals 0 :—

Flowers minute, greenish, polygamous; capsule 2-valved. .. 4. **Crypteronia.**

1. **LAGERSTRŒMIA** Linn.

Trees or shrubs. *Leaves* opposite or subopposite, distichous, entire; petiole short. *Flowers* handsome, bracteate, in terminal and axillary panicles; bracts and bracteoles usually paired. *Calyx-tube* cupular or campanulate, coriaceous, smooth or ribbed outside, persistent; lobes valvate, 6 or more. *Petals* 6 or more, wrinkled or crisped, alternating with the calyx lobes. *Stamens* numerous, inserted at the base of the calyx-tube; filaments often curled, filiform, usually some sterile; anthers versatile. *Ovary* 3-6 celled, superior; style long, filiform; stigma capitate; ovules numerous on axile placentæ. *Capsule* coriaceous, more or less adnate to the base of the calyx, loculicidally dehiscent, 3-6 celled; seeds numerous, winged at the apex, erect, compressed.

Capsules over .5 in. long :—

Flowers white, .3-.5 in. across; calyx tube not ribbed; leaves greyish beneath. .. 1. *L. parviflora.*

Flowers mauve, 2-3 in. across; calyx tube prominently ribbed; leaves green beneath. 2. *L. Flos-Reginæ*.

Capsules under .3 in. long :—

Flowers white; calyx ribbed. 3. *L. minuticarpa*.

1. *Lagerstroemia parviflora* Roxb. Var. *bengalensis* Clarke. Vern. *Sida*, *Dhau*, Ass.; *Thengkri*, *Thengkiri*, *Theng-khri-arong*, Mik.; *Bonshitha*, *Bongurudi-phang*, Ajrai, Kach.; *Jarol*, Kuki; *Sidai*, *Bolsidai*, Garo; *Dieng-lang-sing*, Kh.; *Bordhiera*, Nep.

A large to medium sized deciduous tree; branchlets sharply 4 angled, often slightly winged. *Bark* grey or brown, peeling off in thin strips, .5-1 in. thick, reddish-brown and fibrous inside; young parts pubescent. *Leaves* 2-4 by 1-1.5 in., elliptic, oblong or ovate, acuminate or acute, glabrous above, grey and more or less pubescent or puberulous, specially along the nerves beneath, coriaceous; lateral nerves 5-7 on either half, upper meeting in loops, tertiaries prominently reticulate above; petiole very short. *Flowers* .3-.5 in. across, white, fragrant in lax axillary and terminal, downy panicles of cymes; cymes 2-5 flowered, peduncled; pedicels slender up to .25 in. long; bracts leafy, grading into leaves; bracteoles setose. *Calyx-tube* broadly cupular, enlarging and woody in fruit, lobes 6, triangular or lanceolate acute. *Petals* 6, membranous, about .25 in. long, ovate-oblong, margin undulate; outer 6 stamens longer than the rest. *Capsules* .6-.9 in. long, ovoid or ellipsoid, polished, about a quarter immersed in the accrescent calyx, 3 sometimes 4 valved; seeds with a terminal wing which is thickened and somewhat curved on the back, .65-.75 in. long, including the wing.

All over the province except LAKHIMPUR and N.-E. FRONTIER DISTRICTS, ascending to 2,000 ft. in the KHASI HILLS.

Wood greyish brown, hard, annual rings absent. It polishes well and could be used for agricultural implements, country boats, house posts, etc.

Flrs. with new leaves 3-6. Fr. 11-12, long persistent on the tree.

The small fruited form with pubescent leaves has been grouped under Var. *bengalensis* by C. B. Clarke in F. B. I., but as intermediates with larger fruits and pubescent to glabrescent leaves are common in our area, I have not separated the form.

2. Lagerstroemia Flos-Reginæ Retz. Vern. *Ajar*, *Ajhar*, Ass.; *Jarul*, Beng. (Sylh.); *Thing-dou*, Kuki and Lushai; *Jaroi*, *Thing-doi-thing*, Tipp.; *Aojar*, Mech.; *Ajakari*, *Bolasari*, Garo; *Chehar-arong*, *Ojhar*, Mik.; *Ajar-asing*, Mik.; *Dieng-ther*, Kh.

A large and rather branchy tree. *Bark* light grey or pale brown, smooth, peeling off in irregular flakes. *Leaves* usually 4·8·5 in. by 1·5·3·2 in., elliptic, oblong-elliptic or oblong-lanceolate, acuminate, glabrous on both surfaces, nerves prominent beneath, 10-12 on either half, joining to form an intramarginal nerve which becomes discontinuous towards the base; petiole 2·4 in. long. *Flowers* very handsome, mauve purple, 2-3 in. across in downy terminal panicles up to 1 ft. long, ultimate branches cymosely 1-3 flowered; pedicels stout, pubescent, jointed below, the middle. *Calyx* 5·6 in. long, turbinate, covered with grey or brown tomentum, tube ribbed, ribs 12-14, alternately broad and narrow; teeth 6-7, spreading, acute. *Petals* 6-7, 1·1·5 in. long, much crumpled and wavy with deeper coloured veins, margins erose, claw 25·3 in. long. *Capsules* 75·1·25 in. long, oblong-ovoid or subglobose, smooth, seated on the persistent somewhat woody and prominently ribbed enlarged calyx tube, 5-6 valved; seeds including the wing about 5 in.

Throughout the province chiefly found along river banks, old alluvial soils and edges of swamps, sometimes gregarious. Very handsome when in flower for which it is cultivated in most parts of India.

The wood is light reddish brown with very fine medullary rays and pores joined by very fine concentric bands of softer tissue. The timber is excellent and is used for buildings, carts, furniture, etc.

Flrs. 6-8. Fr. cold season.

3. Lagerstroemia minuticarpa Debbarman ex P. C. kanjilal. Vern. *Sinkrit-asing*, *Kunari-asing*, Miri; *Singkut-polut*, Abor.

A large tree 100-130 ft. tall, often with very irregularly fluted stem. *Bark* greenish brown or nearly white, thin, about 12 in. thick, exfoliating in large thin pieces. *Bark* of branchlets peeling off in narrow membranous shreds. *Leaves* opposite, rarely alternate, deciduous, 4·5·5 by 2·2·7 in., elliptic or oblong, ovate-lanceolate, acuminate, subcoriaceous,

puberulous along the midrib and with tufts of hair along nerve axils beneath, otherwise glabrous when mature; lateral nerves 9-12 on either half, arched, upper meeting in loops, tertiaries somewhat laxly sub-parallel, quarternaries reticulate; base often unequal, cuneate or rounded, areoles $\cdot 025$ to $\cdot 05$ in. across; petiole $\cdot 3\text{--}\cdot 5$ in. long. *Panicles* $3\text{--}5\text{--}5$ in. long, terminal, densely pubescent; lower bracts leaf-like; bracteoles lanceolate or subulate, about $\cdot 1$ in. long, caducous; buds clavate or turbinate with a short projection at the apex, 12 ribbed, pubescent; pedicels $\cdot 075$ to $\cdot 15$ in. long. *Calyx* whitish, about $\cdot 15$ in. long, broadly campanulate, thinly pubescent, tube about $\cdot 1$ in. long, ribbed along the sinuses and the back of the teeth; calyx-teeth 6, deltoid, acuminate, thinly pubescent towards the apex within. *Petals* 6, white, oblong, about $\cdot 27$ in. long, crumpled, margins crisped, claw minute. *Stamens* about 12; filaments filiform, 6 stouter than the rest. *Ovary* 6-celled; style curved, exserted, $\cdot 2\text{--}\cdot 25$ in. long; stigma capitate; ovules numerous on 6 axile placentæ. *Capsule* ellipsoid or oblong, $\cdot 21\text{--}\cdot 28$ in. by $\cdot 1\text{--}\cdot 15$ in., 4-valved. *Seeds* $\cdot 15\text{--}\cdot 2$ in. long, wings dorsally ridged, subfalcate, pellucid, $\cdot 1\text{--}\cdot 12$ by $\cdot 04\text{--}\cdot 06$ in.

N.-E. FRONTIER, near Bomjur, Lali, Bereng, Kherempani.

Wood light brown, fairly hard; pores usually in short strings, joined together by softer tissue, medullary rays very fine, annual rings distinct.

Flrs. 8-10. Fr. Cold season— long persistent.

Lagerstroemia indica Linn. *Parul*, Sans. The crepe plant or crepe myrtle.—A handsome small tree with smooth ashy or nearly white bark, peeling off in thin pieces; branchlets sharply quadrangular. *Leaves* 1-3 in. long, elliptic or obovate, subobtuse or subacute, glabrous. *Flowers* very handsome in several shades of white, rose or mauve, $1\text{--}5\text{--}2$ in. across, when open, in dense small panicles. *Calyx* not ribbed. *Petals* long clawed and with much crisped blades, outer whorl of 5-7 stamens larger than the others. *Capsules* less than $\cdot 5$ in. across.

Cultivated throughout the province.

The leaves turn red before falling.

Flrs. rainy season.

2. DUABANGA Ham.

Duabanga sonneratioides Ham. Vern. *Thora* (Kamrup), *Khukan*, *Hokol*, Ass.; *Ramdalu*, Sylh.; *Yaglongphang*,

Iao glau, Cach.; *Banthang*, Tipp. & Kuki; *Manjuong*, Kuki; *Munjinarong*, Mik.; *Dieng-moloi*, *Dieng-bai*, *Dieng-param*, Kh.; *Pi-arong*, Mik.; *Jong*, Lushai; *Kaliangshi*, *Bol-chhim*, Garo; *Lompatia*, Nep.; *Kobo-asing*, Abor & Miri; *Kisadi*, Naga; *Bandar-kanda*, Mech.

A tall handsome tree with drooping branchlets. *Bark* rough, grey, with vertical fissures, thick in old trees; blaze dirty brown. *Leaves* opposite, distichous, red when young, 6-11 by 2·5-4·5 in., oblong to ovate-oblong, shortly acuminate, cordate, coriaceous, glabrous on both surface; lateral nerves 20-25 on either side, subparallel, meeting in an intramarginal nerve close to the margins; tertiary nerves prominent; petiole stout, ·1-·25 in. long, margined. *Flowers* 2-3 in. across with an unpleasant smell, in glabrous compound terminal corymbs; buds globose; pedicels ·7-1 in. long, stout. *Calyx* cup-shaped, persistent, deeply 6-8 lobed; segments ·7-·8 in. long, thick, ultimately spreading. *Petals* creamy-white, falling off early with the stamens, about 1-1·25 in. long, obovate, clawed, crumpled, margins erose, delicately veined. *Stamens* numerous in one series; filaments exserted, inflexed in bud. *Ovary* adnate to the calyx at its base, 4-8 celled; ovules numerous, ascending on thick placenta; style exserted, incurved in bud; stigma clavate, 4-8 lobed. *Capsule* coriaceous, about 2·5 in. across, loculicidally splitting into 4-8 valves. *Seeds* minute; testa produced at both ends into pointed tails.

All over the province ascending to 2,000 ft., in the KHASI HILLS, sometimes gregarious in river banks.

Wood greyish-brown, soft, weighing about 32 lbs. per c. ft. It was formerly used for tea boxes for which it was found unsuitable on account of the yellowish stain it gives rise to and its unpleasant smell. It is, however, well suited for manufacture of ply wood.

3. WOODFORDIA Salish.

Woodfordia fruticosa Kurz. Syn. *W. floribunda* Salish. Sans. *Agni-jwala*, *dhatiri*, Vern. *Dheira*, Nep.

A large spreading shrub with reddish brown bark, peeling off in thin strips; blaze pink; young parts hairy; leaves and branchlets covered with black dots. *Leaves* sessile or subsessile, opposite, sometimes in whorls of three,

distichous, 2.5 by .6-1.5 in., lanceolate or ovate-lanceolate, acuminate; puberulous above, grey and pubescent with more numerous glandular dots beneath; lateral nerves 6-12, meeting in an intramarginal nerve, base rounded or cordate. *Flowers* scarlet, shortly pedicellate, zygomorphic, in short panicles of closely clustered cymes, usually from the axils of fallen or existing leaves; peduncles and pedicels pubescent, usually glandular; lower bracts more or less leafy, upper smaller, brownish; bracteoles minute. *Calyx* scarlet, .4-.6 in. long, persistent, tubular, somewhat curved, oblique at the mouth; lobes 6, about .07 in. long or deltoid, alternating with 6 rudimentary hairy teeth. *Petals* 6, white, acute, scarcely exceeding the calyx lobes. *Stamens* 12, inserted at the base of the calyx tube, exserted, declinate; filaments red; anthers versatile. *Ovary* superior, 2-celled; ovules numerous; style filiform, exserted. *Capsule* with very thin walls, ellipsoid, splitting irregularly, included within the persistent calyx tube. *Seeds* numerous, minute.

KAMRUP, GOALPARA, not common.

The flowers give reddish or yellowish dye which is used in many parts of India for dyeing silk. The leaves and flowers also contain a large percentage of tannin.

Flrs. 1-3. Fr. 4-5, nearly leafless in 2-3.

Leaves on seedlings are alternate, very young seedlings are red.

4. CRYPTERONIA Bl.

Crypteronia paniculata Bl. Incl. *C. glabra* Bl. Vern. *Goru-mora*, Ass.; *Bol-luen*, *Masuging-sep*, Garo; *Dieng-saw-kyr-reng*, *Dieng-oy*, Kh.; *Thengpi-torete-arong*, Mik.

A large tree with spreading crown and fluted stem. *Bark* pale grey or brown, exfoliating in long curled up, somewhat brittle strips, exposing a cinnamon brown surface, chocolate or reddish-brown inside, about .15-.2 in. thick. *Branchlets* glabrous. *Leaves* opposite, 2-farious, 4-7 by 1.3-2.5 in., lanceolate or elliptic to ovate-lanceolate, entire, acuminate; base acute or tapering to the petiole, subcoriaceous, glabrous. (in our area); lateral nerves 6-8, except the lower, arcuate and meeting in loops; petiole about .25 in. long. *Flowers* greenish-white, polygamo-diœcious, minute, about .1 in.

across, in elongate, puberulous paniced racemes, branched from near the base or fascicled at the ends of branches or on the nodes, 3·5-7 in. long; pedicels ·05 in. long, filiform; bracts minute, setose, shorter than the pedicels. *Calyx-tube* short, puberulous, persistent, cup-shaped, spreading in fruit. *Calyx* teeth usually 5, rarely 4, triangular, acute. *Petals* 0. *Stamens* usually 5, alternating with the calyx teeth, and inserted near the top, often unequal. *Ovary* free, globose, grey pubescent, 2-celled; style long; stigma capitate, sub 2-lobed; ovules numerous on axile placentas. *Capsule* 2-celled, small, about ·07 in. across, globose, pubescent, crowned by the persistent style, dehiscing at the top, across the dissepiment, and the style. *Seeds* numerous, minute; testa produced at each end.

LAKHIMPUR, KAMRUP, CACHAR, SIBSAGAR, GARO HILLS, foot of the KHASI HILLS. probably also in DARRANG.

The wood is reddish-brown. soft. pores distant, medullary rays fine, annual rings indistinct. It is being used for sleepers after antiseptic treatment.

Flrs. 11-12. Fr. 2-3.

Like Brandis I have followed C. B. Clarke's suggestion in including under this species Blume's *C. glabra*, which is the form occurring in our area.

The genus has been excluded from Lythraceæ in Engler's Pflanzenfamilien.

Punica Granatum Linn. The pomegranate. *Darimba*, Sans.; Vern. *Dalim*, Beng. and Ass.; *Darmi*, Nep.; *Anar*, Hind.; *U. soh-pomegranate*, Kh.

A large deciduous shrub, often armed. *Leaves* opposite, 1-2·5 in. long, oblong-oblancoate or oblong-lanceolate, shining, glabrous, entire, pellucid-punctate, narrowed at the base to a very short petiole. *Flowers* bright scarlet, about 1·5-2 in. across, solitary or 2-4 together. *Calyx* campanulate, adnate to and produced beyond the ovary, accrescent in fruit, 5-7 lobed. *Petals* crumpled. *Stamens* numerous. *Ovary* inferior, many celled in two whorls. *Berry* globose, many celled. *Seeds* angular with a pinkish or red watery outer coat.

Cultivated in most Districts.

AMMANNIA Linn.

Annual glabrous, acquatic herbs with minute flowers in trichotomous cymes. *Calyx* membranous. *Stamens* 2-8.

The following species occur in the Province :—

Flowers axillary, in spikes :—

Calyx in fruit campanulate, larger than broad :—

1. **A. peploides** Spreng.

Herb.

Capsule 2-valved

Cauline leaves elliptic.

GOALPARA.

Fr. 1.

2. **A. rotundifolia** Ham.

Herb.

Capsule 4-valved.

Leaves orbicular.

SHILLONG.

Fr. 3.

Flowers in cymes.

3. **A. baccifera** Linn.

Herb.

Leaves oblong or narrow elliptic;

cauline leaves 2 ft. by 4 in. (or less).

Capsule globose and imperfectly circumsciss.

4. **A. multiflora** Roxb.

Herb.

Leaves oblong, elongate, sub-auriculate.

Cauline leaves 1-1.5 in. long.

Capsule globose, not enclosed by the calyx.

KHASI HILLS. (Kaling.)

Fr. 12.

FAM. 61. ONAGRACEÆ.

Herbs, rarely undershrubs, sometimes aquatic. *Leaves* opposite or alternate, extipulate. *Flowers* bisexual, regular or sometimes irregular. *Calyx-tube* wholly adnate to the ovary (half adnate in *Trapa*), lobes 2-5, usually 4. *Petals* alternating with the calyx lobes, rarely 0. *Stamens* as many or twice as many as the petals inserted with them. *Ovary* inferior (half inferior in *Trapa*), 1-6, usually 4-celled; style simple or with 2-4 lobed stigma; ovules 1-many in each cell

on axile placentas. *Fruit* dehiscent or indehiscent 1 (Trapa) or many seeded.

- I. Seeds many; fruit capsular :—
 Seeds comose. 1. **Epilobium.**
 Seeds not comose :—
 Stamens twice as many as calyx
 lobes. 2. **Jussiaea.**
- II. Seeds 1; fruit with spiny pericarp :—
 Aquatic herb. 3. **Trapa.**

1. EPILOBIUM Linn.

Herbs or undershrubs. *Leaves* alternate or opposite, simple entire or toothed. *Flowers* axillary and solitary or racemed or spiked at the ends of the branches, pink, purple or white, regular or irregular. *Calyx-tube* linear, scarcely produced above the ovary, teeth 4, lanceolate, deciduous. *Petals* 4, obovate, retuse or notched. *Stamens* 8, epigynous, alternate ones shorter. *Ovary* inferior, 4-celled; style cylindric; stigma 4 lobed or more or less combined; ovules many, axile. *Capsule* linear, 4-celled, valves separating from the seeds bearing central column. *Seeds* numerous, obovoid or ellipsoid, crowned by long silky hairs.

Stems not sharply quadrangular :—

- Stem pubescent with curled hairs; leaves
 thinly pubescent on the nerves only;
 flowers about .4 in. across. 1. *E. Hookeri.*
 Stem villose; leaves adpressed villous on
 both surfaces; flowers 1 in. or more across. 2. *E. khasianum.*
 Stems sharply quadrangular. 3. *E. tetragonum.*

1. **Epilobium Hookeri** C. B. Clarke.

A perennial herb or undershrub attaining 3 ft.; stem and inflorescence pubescent with curled hairs, terete, upper leaves alternate, lower opposite, 1.2-1.7 by .4-.8 in., elliptic or ovate to oblong lanceolate or oblong, subacute; base more or less rounded, denticulate; nerves about 6 on either side, impressed above, thinly pubescent, specially on the nerves; petiole very short, margined. *Flowers* purple, about .4 in. across, in paniced racemes; bracts leafy; pedicels slender, up to .25 in. long. *Calyx-tube* .7-.8 in. long, adpressed, villous; lobes oblong-lanceolate, about .25

in. long. *Petals* obovate, .3 in. long; stigma clavate, elongate. *Capsules* 2-3 in. long. *Seeds* obtuse at the apex, oblong; coma silky.

KHASI HILLS, 4-6,000 ft.

Flrs. 9-10.

2. *Epilobium khasianum* C. B. Clarke.

An undershrub with villous stem. *Leaves* 1.2-1.7 by .4-.7 in., upper alternate, lower opposite, subsessile, elliptic lanceolate to oblong, subacute; base narrowed, denticulate, adpressed villous with tawny hairs on both surfaces; lateral nerves impressed, 5-6 on either side. *Flowers* rose purple in paniced racemes. *Calyx-tube* about .7 in. long, villous; lobes lanceolate acuminate, about .3 in. long. *Petals* about .5 in. long. *Stigma* clavate. *Capsule* 2-3 in. long, fruiting pedicels up to 1 in. long. *Seeds* obtuse at the apex, coma pale brown, silky.

KHASI HILLS 4,500-5,500 ft.

Flrs. 9-10.

3. *Epilobium tetragonum* Linn.

A herb up to 3 ft. high, stem quadrangular with curled hairs on the four angles. *Leaves* .5-2 in., subsessile, oblong or narrow elliptic, denticulate-serrulate; nerves prominent on the undersurface, crisped-hairy. *Flowers* rose or purple, small. *Capsule* 1.5-2 in. long.

KHASI HILLS 4,500-6,000 ft.—C. B. Clarke.

***Epilobium angustifolium* Linn.** Herbaceous. *Leaves* narrow or linear, lanceolate, 2-4 in. long, acuminate. *Flowers* irregular; petals purplish. *Stamens* deflexed on one side. *Style* bent, hairy; stigmas 4. *Capsule* 2-3 in. *Seed* obovoid.

(Mann's No. 319).

2. JUSSIÆA Linn.

***Jussiaea suffruticosa* L. Var. *exaltata* Roxb.**

An erect undershrub attaining 4-5 ft. in height, stem with raised decurrent lines from leaf bases, usually more or less hairy; young parts pilose. *Leaves* 1.5-3.7 in. long, linear or

narrow-lanceolate, acute or acuminate, thinly pubescent or hairy, usually along the nerves; lateral nerves 12-20 meeting to form an intramarginal nerve; base narrowed. *Flowers* yellow, .66-.7 in. across, about .9 in. long, solitary in leaf axils, usually tetramerous, shortly pedicelled. *Calyx-tube* linear, wholly adnate to the ovary, pubescent, lobes ovate-elliptic, about .3 in. long. *Stamens* twice as many as petals, epigynous. *Capsule* cylindric 1-1.5 in. long, ribbed, more or less pubescent, thin-walled, irregularly breaking up between the ribs. *Seeds* minute, reddish-brown, grooved.

In water-logged situation—up to 3,000 ft. in the KHASI HILLS.

Flrs. and Fr. probably throughout the year.

Ridley states in the Journal of Botany, p. 259, Vol. LIX (1921) that the plant called *J. fissendocarpa* by Haines in Journal of Asiatic Society, Vol. XV, No. 7, is the real *J. suffruticosa*. Our plant is probably *J. erecta* L. Var. *exaltata*. The older name has been retained for the present as the exact name is difficult to determine from Ridley's paper.

Flrs. and Fr. throughout the year.

Circæa alpina Linn.

An erect herb. *Leaves* .5-.9 in. long, ovate, almost glabrous, membranaceous. *Flowers* small, in terminal peduncled racemes. *Bracts* minute. *Calyx* limb bipartite. *Petals* 2, white. *Stamens* 2, epigynous; ovary inferior, 1-celled. *Fruit* very small, pyriform with hooked hairs.

KHASI HILLS, 5,000 ft.

Flrs. 8.

3. **TRAPA** Linn.

Trapa bispinosa Roxb. Vern. *Singara*, Beng., Hin.; *Paniphal*, Beng.; *Sringataka*, Sans. The water chestnut.

An aquatic floating, herb. *Leaves* dimorphic, submerged leaves opposite, pinnately cut into thread like segments, looking like roots, floating leaves in rosettes, green, mottled with brown, broadly rhomboid, 1.2-2 by 1.5-2.2 in., toothed except towards the base, densely hairy and reddish purple beneath; petiole up to 5 in. long, swollen and spongy near the top, the inflated portion about 1 in. long, hairy. *Flowers* few, white, tetramerous, close to the surface of water; pedicels stout, short and incurved at first, afterwards elongated and submerged. *Calyx* hairy, half superior, 2 of

the lobes enlarging and becoming spinescent in fruit. *Petals* obovate. *Stamens* 4. *Fruit* single seeded, 1-1.5 in. long, hard, obovoid with a short beak and two lateral sharp spines, dark brown or black when ripe, surface uneven.

In jhils.

The fruit is largely eaten and finds a ready sale.

Flrs. and Fr. cold season.

Trapa natans Linn.—Floating leaves about 1 in. across, sparingly hairy beneath on the nerves; fruit with spines on all the 4 angles.

SYLHET—*Roxburgh*, but does not appear to have been collected since.

Several species of *Cenothera* are cultivated in gardens for their showy flowers.

Cenothera rosea Soland—A small plant about 1 ft. high with pink flowers with obovate petals—has run wild in Shillong. A native of Mexico.

Fuchsias of several species are grown in Shillong and thrive fairly well.

Cenothera Drummondii Linn.

Herbaceous, hairy, more so in young parts. *Leaves* lanceolate or oblong-lanceolate, acute or shortly acuminate, membranaceous, hairy on both sides; lateral nerves 8-10 on either side. *Flowers* solitary, axillary, irregular. *Calyx* tube about 1-2 in. long, wholly adnate to the ovary. *Segments* 4, reddish. *Petals* bright yellow, 4, broadly ovate, epigynous. *Stamens* 8; anthers versatile. *Ovary* inferior; style about 1.5 in. long; stigma 4-partite. *Capsule* 4-celled, about 1 in. long, ellipsoid. *Seeds* numerous, blackish.

KHASI HILLS, 4-5,000 ft. Cultivated, running wild.

Flrs. and Fr. 7-9.

FAM. 62. PASSIFLORACEÆ.

Herbs or shrubs usually climbing by tendrils, rarely erect. *Leaves* alternate, stipulate, simple or lobed, palmi- or penni-nerved, frequently glandular beneath or on the petiole; stipules foliaceous or minute. *Flowers* in axillary cyme, sometimes with one or more of the branches ending in a tendril, rarely solitary. *Bracteoles* 3, rarely solitary,

minute and scattered or forming an epicalyx, rarely 0. *Flowers* regular uni or bisexual. *Calyx* tubular or campanulate; segments 5, imbricate, corona of one or more rows of thread-like filaments or scales or annular from the calyx-tube, sometimes absent. *Stamens* usually 5, springing from the gynophore or free at the base; anthers oblong, 2-celled, basifixed or versatile, introrse. *Ovary* superior on a gynophore or sessile, 1-celled, usually with 2, rarely 4 or 5 parietal placentas; ovules numerous, 2-many seriate; styles free or connate; stigmas usually more or less capitate. *Fruit* a berry or capsule. *Seeds* numerous ovoid or flattened, testa usually pitted with a fleshy cotyledon, foliaceous.

Flowers hermaphrodite; stamens hypogynous .. 1. *Passiflora*.
 Flowers unisexual; stamens perigynous. .. 2. *Modecca*.

1. *Passiflora* Linn. The Passion flowers.

Climbers. *Flowers* 2-sexual. *Calyx-tube* fleshy, segments often coloured within. *Petals* free, inserted on the throat of the calyx. *Corona* usually of one or more rows of filiform segments, springing from the mouth of the calyx-tube and of one or more membranous folds arising lower down the shallow basal cup surrounding the gonophore. *Stamens* 5 on the gonophore; anthers dorsifixed. *Styles* usually 3. *Fruit* baccate.

Petals present :—

Leaves semiorbicular, truncate and 3 cuspidate at the apex; fruit 2 in. long. .. 1. *P. Leschenaultii*.
 Leaves ovate-lanceolate, not lobed, fruit .5 in. across not lobed. 2. *P. nepalensis*.

Leaves 3 lobed :—

Flowers with conspicuous pectinate bracts—whole plant fœtid when bruised. 3. *P. fœtida*.

Petals 0 :—

Leaves lanceolate. 4. *P. suberosa*.

1. *Passiflora Leschenaultii* DC.

A climbing shrub. *Leaves* semiorbicular, broader than long, truncate and 3 cuspidate at the apex, 3-nerved, glabrous or more or less pubescent on the nerves beneath, thinly

subcoriaceous; base rounded; petiole about 1 in. long with 2 glands below the middle. *Flowers* about 2 in. across, white, usually solitary on slender elongate peduncles; bracteoles remote, linear. *Calyx-tube* subrotate with a short tube, lobes oblong. *Petals* as long as the sepals. *Outer corona* of two rows, filiform; *inner corona* short, tubular, membranous, plicated; *basilar corona* small, cup-shaped, surrounding the base of the gynophore. *Fruit* about 2 in. long, glabrous, leathery.

MANIPUR Watt, KHASI HILLS—C. B. Clarke (in F. B. I.).

2. *Passiflora nepalensis* Wall. Vern. *Mi-soh-lah, Soh-ksem*, Khasi.

A glabrous climber with slender angular branches. *Leaves* 2-4 by 1·5-2 in., ovate-lanceolate, acute or acuminate, apiculate, more or less 3 nerved, other lateral nerves weak, arched glabrous or somewhat glaucous beneath; base truncate or subcordate; petiole 1-3 in. long, usually with 2 raised glands. *Peduncles* 4-5 from each axil, 1-1·5 in. long; petioles jointed above the middle, usually 1-flowered. *Flowers* about ·5 in. long, pale yellow. *Calyx-tube* about ·2 in. long, cylindric; lobes nearly equalling the petals; *corona* filiform of several rows. *Fruit* ·5 in. across, globose, purplish.

KHASI HILLS—3-6,000 ft.

Flrs. 7-9. Fr. 10.

3. *Passiflora foetida* Linn.

A slender climbing shrub, foetid smelling when bruised. *Leaves* 1·5-3·5 in. long, usually 3-lobed; lobes shortly acuminate or acute; lateral shorter, usually 5 nerved, membranous, margins ciliate with gland tipped setaceous hairs, similar hairs on the petiole along the margin above; retuse; base broadly cordate or petiole 1-2 in. long; stipules laciniate with gland tipped segments. *Flowers* 1·25 in. across, greenish-white, mostly solitary with an epicalyx of pinnatifid bracteoles cut up into moss-like gland tipped pectinate segments, about ·5 in. long enlarging with age. *Coronal* processes filiform, white and purple. *Fruit* globose, about ·7 in. across, greenish, invested by the epicalyx.

Fairly common as an escape in most districts in the plains along roadsides and in vicinity of habitations. An inhabitant of Tropical America.

Flrs. hot and rainy season. Fr. 11.

4. *Passiflora suberosa* Linn.

A climbing herb. *Leaves* lanceolate, 3-4 by 1-1.5 in., subcoriaceous, strongly nerved; petiole jointed in the middle. *Flowers* small; bracteoles absent or if present not forming an epicalyx under the flower. *Petals* absent.

A native of Tropical America, sometimes occurring as an escape in village hedges.

P. adenophylla Mast.

A slender but fairly extensive climber. *Leaves* pale green, 3 lobed, 2.3 by 2.5-4.5 in.; lobes sub-obtuse, mucronate, membranous, entire, except for few glandular serratures near the sinuses; base sub-truncate or broadly retuse, 5 nerved; petiole 1-2 in. long with glands; stipules large, leafy, about 1.25 in. long, broadly subfalcate, auricled at the base. *Flowers* 2-3 in. across, solitary; peduncles with 3 leafy bracteoles near the top. *Petals* purplish blue; *coronal* filaments blue and white.

A native of Madagascar. Naturalized in the KHASI HILLS, 4-5,000 ft.

Flrs. 8.

P. edulis Sims. The passion fruit from Brazil. Vern. *Khasia Bel.* Beng.—A perennial climber with 3-lobed, toothed, glabrous leaves; large bluish purple flowers and purplish edible fruits. The pulp has strong *bael* like smell whence the Bengali name.

Besides the above several other species are cultivated in gardens in our area.

P. laurifolia Linn.

A climber, herbaceous, entirely glabrous, but fairly extensive; tendrils simple, axillary, long. *Leaves* 4.5-6 by 1.7-2.5 in., entire, ovate, oblong; petiole short. *Flowers* large, blue, fragrant, solitary or in axillary peduncles. *Involucre* 3-leaved. *Corona* 3-plex. *Berry* greenish yellow, white punctate. *Seeds* compressed, cordate.

Cultivated, but is naturalized in some places, e.g. Gogong Bil (Kulsi reserve), KAMRUP, NOWGONG (Kukrakata Reserve).

2. MODECCA Lam.

Modecca trilobata Roxb.

A large glabrous climber; branchlets sulcate. *Leaves* distant, 6-8 in. long, palmately 3-5 lobed, upper lobes with

deep sinuses, cordate, sub-truncate or hastate at the base, membranous; main lateral nerves 2 on either side, lowest sub-basal, connected by more or less subparallel tertiaries, 2 circular glands on the undersurface near the base; lobes acuminate; petiole 2·5-4 in. long with two glands at the apex. *Flowers* unisexual; peduncle axillary, 6-10 in. long, divided into 2-3 branches near the top, one of which ends in tendrils and the others in many flowered often cirrhose cymes. *Male flowers*:—*Calyx* less than ·5 in. (Masters)—campanulate, 5 lobed. *Petals* obovate-oblong, springing from the base of the calyx-tube. *Stamens* 5, united at the base; filaments slender; anthers obtuse. *Glands* of the disk ligulate, incurved, opposite the sepals. *Pistillode* minute. *Calyx* and petals as in the male but larger. *Glands* of disk ribbon-like, recurved. *Staminodes* 5, united at the base into a membranous cup. *Gynophore* short. *Ovary* elongate, ovoid; style short; stigma large, capitate, 3 lobed. *Fruit* scarlet, 2·5 by 1·25 in., on carpophore about ·6 in. long, capsular, 3 valved. *Seeds* many, flat; testa reticulate; aril-sweetish.

KHASI HILLS 3-5,500 ft.

Flrs. 7. Fr. 8.

Modecca cardiophylla Mast.—A glabrous climber. *Leaves* 6-8 by 4-5 in., ovate-cordate, acute or shortly acuminate, entire, rarely palmately lobed, membranous; petiole 2-3 in. long with a sessile gland on either side of the apex. *Peduncles* about as long as the petioles, bearing many flowered cymes, one branch cirrhose. *Male flrs.* ·12 in. across. *Petals* 5, springing from about the middle of the calyx tube; anthers obtuse. *Female flower* larger. *Staminodes* cohering in a membranous tube towards the base. *Ovary* on a short gynophore; stigma large, peltate with 3 wedge-shaped lacinate lobes.

KHASI MOUNTAINS & ASSAM—Masters; above Barapani, KHASI HILLS.

Flrs. 6-7. Fr. 8.

FAM. 63. CUCURBITACEÆ.

Climbing or prostrate herbs or shrubs, tendrils mostly present, spirally coiled. *Leaves* alternate, simple, lobed or pedately divided. *Flowers* unisexual, monœcious or diœcious, solitary, axillary or in cymes or racemose, yellow or white, regular. *Calyx* limb rotate, tubular or campanulate, lobes imbricate or open. *Petals* 5, united in a tube or nearly or quite free, sometimes with fimbriated margins, imbricate or induplicate-valvate in bud. *Male flowers* :—*Stamens* inserted at various levels in the calyx-tube, free or variously united, mostly 3, rarely 1-5, one anther usually 1-celled and the others 2-celled; anther cells straight, flexuous or conduplicate, extrorse, the connective sometimes produced beyond pistil-lodes, sometimes present. *Female flowers* :—*Calyx-tube* usually wholly adnate to the ovary and sometimes produced beyond. *Ovary* usually inferior, 3 carpellary placentæ parietal which often intrude in the middle and filled the ovary and thus make it spuriously 3-celled; ovules numerous, rarely few; style 1 with 3 thick stigmas, rarely styles 2-4. *Fruit* generally baccate and fleshy or finally with a hard rind, indehiscent or dehiscing by valves or circumciss, the seeds often packed in pulp or fibre. *Seeds* many, compressed; testa often corrugated or margined, exalbuminous.

I. Flowers white :—

- | | |
|--|--|
| <p>A. Petals free nearly to the base,
fimbriate
Seeds 6; calyx tube over 3 in.
long.
Seeds many; calyx tube under 3 in.
long. </p> <p>B. Corolla campanulate, divided half way
down, lobes not fimbriate. </p> | <p>1. Hodgsonia.</p> <p>2. Trichosanthes.</p> <p>Cephalandra.</p> |
|--|--|

II. Flowers yellow :—

- | | |
|---|---|
| <p>Stamens 5, anthers 1-celled, straight. ..
Stamens 3, anthers conduplicate or
horse shoe-shaped. </p> | <p>Thladiantha.</p> <p>Momordica.</p> |
|---|---|

1. **HODGSONIA** Hk. f. & T.

Hodgsonia hiteroclita Hk. f. & T. Vern. *Til-lau*, Mech.; *Thi-be*, Garo; *Darsani*, *Ghinphal*, Nep.; *Hanthar-angphar*, Mik.; *Mei-soh-mynthar*, Kh.; *Tatar-riube*, Miri; *Thebou-lata*, *Tapouguti*, Ass.; *Thaibai doukha*, Kach.; *Hokta*, Sylh.; *Kathai*, Manip.; *Kha-um*, Lush.; *Khankra*, Cach.

An extensive woody climber with extremely bitter bark. *Leaves* 6-9·5 in. across, each way deeply 3-5 lobed, glabrous, coriaceous; lobes entire or sparingly denticulate, sharply short acuminate or acute; petiole up to 3 in. long; tendrils 2-3 fid from the top, 5-10 in. long. *Flowers* large, diœcious, buds brown tomentose, males in elongate stout racemes up to 10 in. long, brown tomentose when young; bracts ·5 in. long, oblong, entire, acute, deciduous. *Female flowers* solitary. *Calyx* long, tubular, mouth shortly campanulate, brown tomentose outside; tube 3-4, mouth ·4-·5 in. across, teeth 5, short. *Petals* 5, about 2 in. long, connate at the base, long, fimbriate, 4 in. long, and 3 nerved outside, brown villous, white, tinged with yellow within. *Stamens* 3; filaments very short; anthers exserted, linear, connate, cells conduplicate. *Ovary* globose; stigmas 3, oblong, bifid, exserted, placentæ parietal near the base of the ovary. *Fruit* 4-6 in. wide, depressed, globose, red brown, closely tomentose, 12 grooved, flesh hard, extremely bitter; perfect seeds usually six, each usually having a barren one attached to its side, flat, ellipsoid, with sunk veins, 2-3 by 1-1·5 in.

Throughout the province ascending to 3,000 ft., in the hills.

The kernel of the seeds is eaten after roasting. Silk worms are fed on the leaves.

Flrs. 2-3. Fr. 11 ?

2. **TRICHOSANTHES** Linn.

Herbaceous or woody climbers. *Leaves* entire or 3-9 lobed, more or less toothed, tendrils usually 2-5 fid. *Flowers* usually diœcious, less often monœcious. *Males* usually in peduncled racemes with a solitary male less often female flowers from the same axil or female flowers solitary. *Calyx* tubular, dilated towards the top; teeth 5, lanceolate, entire or laciniate. *Petals* 5, connate at the base, lobes long, fimbriate.

Stamens 3; anthers usually connate. *Ovary* inferior; style filiform, 3-6 fid at the apex; placentas 3, parietal; ovules many. *Fruit* lanceolate or globose, smooth, seeds many, compressed, packed in pulp, sometimes angular on the margin.

1. *Trichosanthes palmata* Roxb. Vern. *U-soh-lyn-shang*, Khasi.

An extensive climber, often forming dense masses, stems woody below, with pale grey bark spotted with rows of circular lenticels. *Tendrils* 3, less often 2 fid, 1-2 in. up to the fork. *Leaves* 3-7 in. across, slightly longer or as long, variable, usually palmately 3-7 lobed, 3 nerved outer, forked, close to the base; lobes acuminate or acute, nerves often ending in teeth, dark green with deep pits when fresh and rough with raised cystoliths above, lower surface paler and with cystoliths on the nerves when dry, glabrous or puberulous on the nerves; base deeply cordate; petiole 1-3 in. long, striate, puberulous or ultimately glabrous. *Flowers* 1.5-2.5 in. across; male flowers in elongate racemes, 6-12 in. long, sometimes a solitary flowers from the same axil; bracts leafy, 1-1.5 in. long, broadly obovate, many nerved, fimbriate. *Calyx-tube* up to 1.5 in. long; lobes caudate, lanceolate, sometimes toothed or subpinnatifid. *Petals* 1 in. long, cuneate, long, fimbriate. *Female* flowers on short peduncles. *Fruit* 1.5-2 in. across, ellipsoid or globose, at first red with orange streaks, ultimately deep red; pericarp thick, tough. *Seeds* numerous, reddish-brown not margined, packed in greyish green pulp.

All over the area up to 6,000 ft.

Flrs. 7-9. Fr. 10-11.

Var. *laciniosa* Wall.—Leaves lobed nearly to the base, segments narrow, toothed and sometimes pinnatifid.

KHASI HILLS—up to 6,500 ft.

***Trichosanthes Wallichiana* Wight.**—An extensive herbaceous climber; tendrils 3. *Leaves* 3-7 in. across, digitately 5-7 partite, sometimes close to the base, the outermost segments also often lobed or angled; segments very variable in outline, more or less lanceolate to linear-lanceolate, acuminate, nervules usually excurrent into distant teeth or irregularly pinnatifid, basal nerves 3, outer pair strongly forked

from nearly the base, both surfaces with cystoliths as in *T. palmata*; petiole 1-3 in. long, striate. *Flowers* white, 1.5-2.5 in. across. *Male* flowers in elongate axillary racemes up to 14 in. long; with often a solitary flower from the same axil. *Bracts* leafy, about 1 in. long or longer (?), broadly obovate, fimbriate, many nerved. *Calyx-tube* about 1 in. long; lobes lanceolate, caudate-acuminate. *Petals* long, fimbriate. *Female* flowers on short peduncles. *Fruit* as in *To palmata* (?).

KHASI HILLS 4,500-6,500 ft.

Flrs. 7-9. Fr. 10-11.

Probably only a variety of *T. palmata*.

Trichosanthes multiloba Miq.

An extensive climber. *Tendrils* 2-3 fid. *Leaves* 3-6 in. across, 3-9 usually 5 lobed, about half way down; segments somewhat narrowed towards the base, glabrous or scabrous with scattered bristly hairs on the nerves and cystoliths (at least when dry); base subcordate, lobes toothed; petiole 1-3 in. long. *Flowers* diœcious. *Male peduncles* paired, the racemed one about 6 in. long (or in some varieties longer). *Bracts* deeply toothed. *Calyx-tube* 1-2.5 in., teeth lanceolate, subulate, entire. *Fruit* bright red with orange stripes, 2-4 in., ovoid or oblong acute; seeds .6-.8 in. long, more or less angular on the margins.

KHASI HILLS 2-6,000 ft.

Scarcely more than a variety of the last species. In some forms the leaves are very large.

Trichosanthes cordata Roxb.

An extensive climber. *Leaves* 6-8 in. across, ovate-cordate in outline, entire, angled or obscurely lobed, dentate-serrate. *Flowers* diœcious; bracts obovate, pubescent, entire or scarcely serrate. *Male peduncles* paired, the racemed one stout, up to 8 in. long. *Calyx-tube* 1.5 in. long, densely pubescent outside. *Fruit* globose, similar to those of *T. palmata*; seeds .5 in. long, scarcely angled on the margins.

KHASI HILLS, CACHAR—C. B. Clarke, probably throughout the province.

Trichosanthes truncata C. B. Clarke.

An extensive herbaceous climber, tendrils 2-3 fid. *Leaves* 4.5-5 by 2.5-3 in., ovate acuminate; base rounded or truncate (never sometimes subpeltate, distantly denticulate or entire, glabrous; flowers thinly coriaceous, cordate); petiole up to 1.7 in. long. *Male flowers* white, solitary in leaf axils or in peduncled cymes; peduncles 2-6 in. long; bracts narrowed at the base not sheathing. *Calyx-tube* tomentose outside, about .75 in. long (.75-1.5 in. according to F. B. I.); lobes reflexed, linear lanceolate.

Female plant not seen.

Mamloo—KHASI HILLS, 4,500 ft.

Flrs. 9-10.

Trichosanthes dioica Roxb. Vern. *Potol*, Beng., Ass., Sans.; *Parwal*, Hind.—A climber with perennial rootstock with scabrous and more or less woody stems. *Leaves* about 3 by 2 in., ovate-oblong, cordate, acute, sinuate dentate, not lobed, nor angled, rough on both surfaces; petiole .75 in. long. *Male peduncles* paired but not racemed, male flowers woolly outside. *Calyx-tube* about 1.75 in. long, narrow, lobes erect, anthers free. *Fruit* 1.5-3 in., oblong or nearly spherical, often with light green stripes, red when ripe. *Seeds* half ellipsoid, corrugate on the margins.

The wild form in submontane tracts has often bitter fruit. The fruit of cultivated form is a very wholesome vegetable and sometimes 4.5 in. in length in some races. The fruits are medicinal.

Flrs. hot season. Fr. rainy season.

Trichosanthes anguina Linn. Vern. *Chichinga*, *Chichinda*, Beng. The snake gourd.—A large climbing herb with suborbicular often 5 lobed or angled leaves and long elongate cylindric, sometimes contorted fruits, pointed at either end and 1-3 ft., long, at first glaucous green, streaked with white, ultimately bright orange.

Sometimes cultivated for the fruits which are used as vegetable.

Fr. rainy season.

CEPHALANDRA Schrader.

Cephalandra indica Naud. Syn. *Coccinia indica*, W. & A. Vern. *Bimbadhar*, Sans.; *Telakucha*, Beng.; *Kundru*, Hin.—A perennial with tuberous roots. *Leaves* 1.5-4 in. across, 3-5 angled or lobed, cordate, marked with numerous disks and more or less rough above; petiole .5-1.5 in. long. *Flowers* white; male peduncle .7-1.5 in. long, 1-flowered; female peduncle short. *Calyx-tube* campanulate, short, limb 5-lobed. *Corolla* about 1 in. long, campanulate, 5-lobed, $\frac{1}{2}$ way down, lobes papillosely hairy within. *Ovary* smooth. *Fruit* 1-2 in. long, ovoid or oblong, beaked, red when ripe, marked with white or greenish stripes; seeds many.

Common in hedges.

The fruit is eaten, the plant is also used medicinally.

Flrs. hot and end of rainy season.

THLADIANTHA Bunge.

Thladiantha calcarata C. B. Clarke. Syn. *T. dubia* F. B. I.

A large climber with sulcate pubescent branches. *Leaves* 3-4 by 2.2-7 in., deeply cordate-ovate, neither angled nor lobed, acute or shortly acuminate, denticulate, somewhat rough above with cystoliths tipped with sharp points, villous beneath, basal nerves 3-5; petiole about 1.7-2.2 in. long. *Tendrils* usually simple. *Flowers* about 1.5 in. across, golden yellow, dioecious; male peduncles often paired, one 1-flowered, ebracteate, caducous, the other racemed with inciso-

serrate bracts, .6-.7 in. long. *Calyx-tube* short, campanulate, the bottom shut by a horizontal scale. *Corolla* campanulate, 5-partite, the lobes revolute. *Stamens* 5; anthers one celled, straight. *Ovary* woolly when young. *Fruit* 1.5 in. long, oblong, glabrous, fleshy with many seeds.

KHASI HILLS, 4-5,000 ft., Mann.

Flrs. rainy season. Fr. cold season.

Thladiantha Hookeri C. B. Clarke.—Large climber with sulcate branches. *Leaves* 3-4 in. long, acute or acuminate, polymorphic, simple and ovate-cordate to digitately tripartite with oblique lateral segments, often auricled at the outer edge, membranous and hispidulous on both surfaces. *Tendrils* simple. *Flowers* golden yellow; male peduncles in pairs, both one flowered and racemed, one ebracteate with lax pedicels. *Petals* .5-.6 in. long. *Fruit* about 1.25 in. long, oblong.

KHASI HILLS—Mann. ASSAM—Griffith.

MOMORDICA Linn.

Momordica dioica Roxb.

Perennial climber with tuberous root, stems slender. *Leaves* 1.5-4 in. long, cordate, ovate, acute more or less 3-5 lobed, distantly denticulate, glabrous, punctate beneath; petiole 1-2 in. long. *Flowers* large, dioecious, yellow, male peduncles 1.5-6 in. long, 1-flowered with a persistent hooding pubescent bract, .5-.7 in. across, embracing the flower. *Female peduncle* nearly as long as the male with a small bract below the middle. *Calyx-tube* short, campanulate; lobes linear lanceolate, acute. *Corolla* 6-partite nearly to the base; lobes .5-1 in. long, prominently veined. *Stamens* 3; anther cells horse shoe-shaped. *Ovary* clothed with long soft papillæ. *Fruit* 1-3 in. long, shortly beaked, densely covered with soft spines; seeds many.

KHASI HILLS, 5,000 ft., Mann, probably throughout the plains. The young fruit is eaten in curries.

Flrs. rainy season.

Momordica Charantia Linn. Vern. *Karala*, Beng.; *Karela*, Hin.; *Tita karela*, Ass.—A short climber. *Leaves* 1-3 in. across, deeply 5-7 lobed; lobes lobulate or sinuate-dentate. *Flowers* monœcious, yellow. *Fruit* 1-5 in. long, tapering at both ends, longitudinally ribbed with rows of triangular tubercles, fleshy but dehiscent; seeds immersed in bright red pulp.

Cultivated and sometimes apparently wild.

The bitter fruits are largely used as vegetable.

Momordica cochinchinensis Spreng. Vern. *Kankrol*, Beng.; *Bhat karela*, Ass.

A large climber with perennial rootstock and tuberous root.

Leaves 4-5 in. across, suborbicular in outline, usually 3-lobed, glabrous or nearly so, firm, punctate beneath. *Flowers* diœcious, large, whitish. *Fruit* 3-5 in. long, ovate or oblong, covered with conical points, bright red when ripe.

Cultivated and often apparently wild.

The tender fruits are much esteemed as vegetable.

Flrs. & Fr. hot and rainy season.

Zehneria umbellata Thw. Vern. *Soh-khia-phlang*, Kh.

A herbaceous climber with angular glabrous stem; tendril climbing. *Leaves* usually hastate, narrow-lobed, polymorphous, 4-6 in. long; acute or acuminate, chartaceous, beneath. *Flowers* diœcious, small, dull white; male corymbose. *Calyx* teeth 5, small. *Corolla* lobes 5, triangular. *Stamens* 3, the female solitary. *Ovary* narrow-oblong; style cylindric. *Fruit* globose. *Seeds* small, obovate, smooth.

KHASI HILLS, GARO HILLS, 1-4,000 ft.

Flrs. 3. Fr. 9.

Gynostemma pedata Bl.

A herbaceous slender climber; tendrils simple. *Leaves* usually pedately 3-foliolate. *Leaflets* vine-like, ovate-lanceolate, usually oblique, crenate-serrate. *Flowers* minute, in diffuse long, axillary panicles; branchlets not pubescent. *Calyx* white, 5-partite. *Corolla* lobes lanceolate. *Stamens* 5, inserted at the bottom of the calyx. *Ovary* spherical. *Fruit* globose; berry greenish.

KHASI HILLS, 3,000 ft.

Flrs. & Fr. 8-9.

The following are also cultivated :—

1. **Luffa ægyptiaca** Mill. Vern. *Dhundul*, Hind.; *Ghiyatori*, *Bhol*, Ass. Large climber; leaves reniform, orbicular, 5-angled or lobed, about 4 in. across. *Flowers* monœcious, yellow on long peduncles. *Fruit* 5-12 in. long, smooth, ultimately filled with fibre and 3-celled inside, circumciss at the top.

The young fruit is esteemed as a vegetable and the fibres are used as a flesh brush. Sometimes apparently wild.

2. **Luffa acutangula** Roxb. Vern. *Jhinga*, Beng., Ass.; *Tori*, Hind. Very similar to the above but the fruit is acutely 10-ridged and the seeds are more prominently tubercled. The young fruit is esteemed as a vegetable.

Var. amara Clarke. *Leaves* smaller, ribs of fruit not so sharp; seeds smaller.

The fruit is intensely bitter and emetic.

3. **Benincasa cerifera** Savi. Vern. *Chalkumra*, Beng.—A large climber with hispid stem. *Leaves* 4-6 in. across, reniform, orbicular, more or less 5 lobed or angled, cordate, hispid beneath. *Flowers*

large, yellow, monœcious. *Fruit* 1-1.5 ft. long, oblong, hairy when young, ultimately covered with a waxy bloom.

4. **Cucumis melo** Linn. Var. *ultissimus* Duthie, Vern. *Kankur*, Beng. An annual with orbicular reniform 5 angled or lobed leaves about 3 in. across, rough on both surfaces. *Flowers* yellow, monœcious. *Fruit* fleshy cylindrical to elongate or contorted, often quite long.

Var. **Momordica** Duthie. Vern. *Phuti*, Beng.—*Fruit* 1-2 ft. by 3-6 in., cylindrical to oblong, bursting spontaneously when ripe.

5. **Cucumis sativus** Linn. The cucumber. Vern. *Sasha*, Beng.; *Khira*, Tiyanish, Hind.

6. **Citrullus vulgaris** Schrad. The water melon. Vern. *Tormuj*, Beng.; *Tarbuza*. *Kharmuja*, Hind.

Cultivated along sandy banks of rivers.

7. **Lagenaria vulgaris** Ser. The bottle gourd. Vern. *Lau*, *Panilau*, Beng. A softly pubescent climber with large bottle or dumbbell-shaped fruits.

Largely cultivated throughout the area for the fruits.

The dried shell of the fruit is much used for holding water.

8. **Cucurbita moschata** Duchesne. The musk melon. Vern. *Kumra*, Beng.; *Lal-kumra*, *Mitha-lau*, Ass.; *Mitha-kadu*, *Kadu*, Hin.

Extensively cultivated as a rainy season vegetable. The indumentum on the leaves is even the calyx lobes of the female flowers have usually foliaceous tip or are spatulate and fruiting peduncle is slightly expanded below the fruit. The flesh of the fruit is reddish and has a faint musk-like scent.

9. **Cucurbita Pepo** DC. Vern. *Kumra*, Beng.; *Pathao*, Kh.

A more hispid plan than the last; the petiole is pubescent and has also rigid prickly hairs, the calyx lobes are subulate; the fruiting peduncle is grooved and the flesh of the fruit is pale and not scented.

Often grown in hilly districts.

10. **Sechium edule** S. W. Vern. *Chayote* or *Chocho*, *Soh-kwash*, Khasi; *Quash*, *Eskoch* (Beng., probably from Eng. squash). An extensive climber with perennial rootstock. *Flowers* yellow, monœcious. *Fruit* pyriform, up to 4.5 in. long, with distant soft spines containing one large seed.

A native of Tropical America. Cultivated very commonly in the KHASI HILLS, where in certain season it is the most plentiful vegetable.

Flrs. and Fr. 7-11.

FAM. 64. BEGONIACEÆ.

Mostly perennial herbs with thick rhizome or tuber, several climb by aid of roots like ivy; may be cultivated for handsome flowers and foliage. *Leaves* radical or alternate, more or less inequilateral, entire, lobed or digitately partite, usually toothed; stipules 2, large, often deciduous. *Flowers* showy, unsymmetrical, monœcious, in axillary peduncles, bracteate at base, divided above in dichotomous cymes; bracts and bracteoles opposite. *Male flowers*: perianth segments petaloid, usually 2, outer pair valvate. *Stamens* numerous; filaments free or connate in a bundle; anthers linear oblong or clavate. *Female flowers*: perianth segments 2-5. *Ovary* inferior, 2-4-celled (usually 3); style 2-4, free or connate at the base; ovules numerous, placentæ axile. *Fruit* capsular, usually winged, usually loculicidally dehiscent or breaking up irregularly. *Seeds* minute; albumen scanty or 0.

Placentas 2-fid :—

Fruit more or less fleshy (not dehiscing
on the faces) 4-celled :—

Anthers narrowly oblong :—

Connective slightly produced. .. 1. **B. Roxburghii.**

Capsule 2-celled, compressed :—

Anthers obovoid :—

Connective produced above the anther
cells. 2. **B. laciniata.**

This family is of no forest importance but very widely represented in the province. Few species are only described below. Many are cultivated.

1. **Begonia Roxburghii** A. DC. Prodr.

A stout succulent plant, root fibrous. *Leaves* 6-12 by 4-8 in., ovate acuminate, irregularly toothed, glabrous or minutely pubescent on the nerves, very obliquely cordate at

base and unequal, strongly nerved; petiole 3-9 in. long. *Flowers* fragrant. *Ovary* 4-celled.

KHASI HILLS, 4,000 ft.

Flrs. 7.

2. *Begonia laciniata* Roxb.

Stem 6-24 in. long, brownish. *Leaves* 3-8 by 2-6 in., acutely lobed; lobes caudate-acuminate, ciliate, distantly serrate, softly pubescent; base shallowly cordate; petiole 2-4 in. long, brownish tomentose; stipules persistent, pubescent, outer perianth segments pinkish, connective produced above the anther cells. *Fruit* 1 by .5 in., pinkish, 3 winged, the posterior being much larger than the others; 2-celled.

KHASI HILLS, 4-6,000 ft.

Flrs. 8-9. Fr. Cold season.

Begonia Josephi A. DC. A variable herb usually stemless. *Leaves* peltate, ovate, lobed, crenulate. *Flowers* whitish or rose purplish. *Capsule* 3-winged, one wing much the larger.

KHASI HILLS, 3-4,000 ft.

Flrs. 8-9. Fr. Cold season.

Begonia picta Sm. Exot. Bot. A herb. *Leaves* ovate, acuminate, somewhat cordate, doubly serrate. *Ovary* and young capsule very pubescent. *Capsule* 3-celled, triquetrous with one wing more elongated.

KHASI HILLS, 3-4,000 ft.

Flrs. & Fr. 7-8.

Begonia Thomsonii A. DC. A caulescent hairy herb. *Leaves* ovate, usually acuminate, somewhat cordate and oblique, hispid ciliate; petioles densely rusty-pubescent. *Capsule* hairy with a descending wing.

KHASI HILLS, 3-4,000 ft.

Flrs. 8. Fr. 10.

FAM. 65. DATISCACEÆ.

Trees or herbs. *Leaves* simple or pinnate, exstipulate. *Flowers* small, diœcious, apetalous, racemed or paniced or clustered. *Male flowers*: *Calyx-tube* short, teeth 3-9; petals 0. *Stamens* 4-25; pistillode sometimes present. *Female flowers*: *Calyx-tube* adnate to the ovary, lobes 3-8, short; ovary 1-celled, closed or open at the top, placentæ parietal; styles as many as placentæ, simple or 2 partite; ovules numerous, ascending or horizontal. *Capsules* coriaceous or membranous, opening at the apex between the styles. *Seeds* numerous, albuminous.

1. TETrameLES R. Br.

Tetrameles nudiflora R. Br. Vern. *Pagarang*, *Pak-arong*, Mik.; *Bolam*, Mech.; *Dieng sharet*, *Dieng-sarapi*, *Dieng-Taro*, Kh.; *Bong-lep*, Kach.; *Telo*, *Tula*, Cach.; *Thing-dol*, Lushai, Tipp.; *Oang-phop*, Manip.; *Bhelu*, *Dubong*, Ass.; *Bol-bok*, *Dumbong*, *Awek*, Garo; *Dol-theng*, Kuki; *Chamchola*, Beng. (?).

A very tall deciduous tree, branched very high up, usually buttressed near the base. *Bark* smooth, greyish or greyish-white, spongy, marked with horizontal wrinkles and small lines of lenticels peeling off in thin papery layers about 1 in. thick. *Leaves* 3·5-6 by 2·7-5·5 in., broadly or sub-orbicular ovate acuminate, irregularly toothed, 5-7 nerved, bright green and thinly pubescent or glabrate above, (at least when mature), paler and softly pubescent on the nerves beneath; lateral nerves 3-5 on either side above the basal; base cordate; petiole 2-4 in. long, terete, softly pubescent. *Flowers* diœcious appearing before the leaves in many flowered pubescent racemes or panicles at the ends of branches or axils of fallen leaves, small, yellow. *Male flowers* subsessile, in fasciculate panicles 6-10 in. long. *Calyx-tube* very short, lobes 4, sometimes with an interposed small tooth equal or unequal, linear oblong, subacute, glabrous, exceeding the tube. *Petals* 0. *Stamens* 4, opposite the calyx lobes,

inserted round a flat central disk, exserted; anthers small. *Pistillode* 0, quadrangular. *Female flowers* sessile or nearly so in numerous pendulous spicate, sometimes branched racemes. *Calyx-tube* adnate to the ovary; limb urceolate pubescent outside; teeth 4, short, triangular, acute. *Ovary* 1-celled, 8-ribbed; ovules numerous on 4 parietal placentæ; styles 4, subulate, exserted, persistent; stigmas clavate. *Capsule* .2-.25 in. long, urceolate or obovoid, dotted with minute glands outside, 8 ribbed, truncate at the apex, walls membranous, dehiscing between the styles. *Seeds* minute, numerous.

Throughout ASSAM ascending to nearly 2,000 ft.

Wood white, soft, very light, pores large. Used at present for matches.

Flrs. 2-3. Fr. 5 (?).

FAM. 66. CACTACEÆ.

Succulent plants, stems of various shapes, columnar club-shaped, spherical, compressed, angled etc. *Leaves* rarely well developed, usually reduced to scales in the axils of which are cushions known areoles on which are borne tufts of hairs or spines. *Flowers* usually solitary and axillary on the areoles or terminal between tubercles on the stem. *Perianth* usually regular, rarely somewhat zygomorphic of many whorls which are united and tubular at the base, superior. *Stamens* numerous, inserted usually on the perianth tube. *Ovary* inferior, 1-celled, with several intruded placentæ; styles and stigmas as many as the placentæ. *Fruit* generally baccate, 1-celled; seeds many.

1. OPUNTIA

Opuntia monocantha Haw. Prickly pear. Vern. *Phani-manasha*, Beng., Hind.; *Nagphan*, *Hagar-phana*, Ass.

A large succulent shrub with dark green spiny joints, branched from near the base. *Joints* obovate or oblong,

much compressed. *Leaves* caducous, .2 in. long, lanceolate, brown, terete in section, areoles with dense pale brown shining bristly usually multicelled hairs up to .2 in. long and 1-3 spines of which one is usually larger than others and attains 2 in.; the largest spine and less often a smaller one is persistent and the rest deciduous. *Flowers* 2-2.5 in. long and 3 in. across, yellow or only reddish outside. *Perianth* rotate, outer segments short, ovate-acute, inner spatulate, acute. *Stamens* yellow, short. *Pistil* longer than the stamens. *Berry* pyriform, truncate with a deep obconic depression at the apex and areoles with tufts of brown minutely barbed bristles.

Planted in hedges and apparently run wild near villages up to 4,900 ft. in KHASI HILLS (Shillong).

The fruit is edible but is not relished.

Flrs. hot season.

Opuntia Dillenii Haw. Prickly pear. Vern. *Nag-pheni*, Beng.

A straggling shrub, with grey green or bluish green, oblanceolate or obovate joints; margins entire, lower joints often corky. *Areoles* with 4-6 thorny, sometimes stout spines and numerous barbed bristles. *Flowers* sulphur-yellow-orangish. *Perianth* white. *Berry* pyriform, depressed at the apex bearing tufts of barbed bristles, deep purple when ripe.

KHASI HILLS, 5,000 ft.

Frs. & Fr. 7-9.

AIZOACEÆ (Ficoideæ).

Herbs. *Leaves* simple, often fleshy; sometimes falsely whorled; stipules scarious or absent. *Flowers* usually in cymes or fascicles, regular, bisexual or polygamous (rarely). *Calyx* segments 4-5, free or rarely adnate to the ovary. *Petals* usually absent. *Stamens* 5 or indefinite; filaments usually connate at base; anthers 2-celled. *Ovary* 3-5-celled; ovules numerous. *Fruit* ovate, membranous, circumscissile capsule. *Seeds* reniform.

MOLLUGO Linn.

Branching often dichotomous, herb. *Calyx* deeply 5-partite. *Petals* 0. *Stamens* hypogynous. *Fruit* syncarpous. *Capsule* 3-5-celled, loculicidal. *Seed* sometimes appendaged.

Mollugo pentaphylla Linn. (*M. stricta* Linn) Vern. *Khet-papra*, Beng.

An erect slender glabrous herb. *Leaves* very variable. *Inflores-*

science in compound terminal cymes. *Seeds* not appendaged at the hilum.

KHASI HILLS, 3-4,000 ft.

Flrs. 6.

M. lotoides Okze. (*M. hirta* Thunb.).

A stellately haired prostrate herb. *Leaves* usually almost orbicular. *Inflorescence* in axillary clusters. *Flowers* sessile. *Seed* with a membranous scale with a long curved bristle.

SIBSAGAR.

Flrs. 3.

M. oppositifolia Linn. (*M. Spergula* Linn.).

A slender prostrate herb, glabrous or almost glabrous. *Flowers* pedicelled. *Seeds* with a short bristle.

CACHAR.

Flrs. 4.

FAM. 67. UMBELLIFERÆ.

Herbs (rarely shrubs or trees). *Leaves* usually alternate, simple or compound; petiole generally sheathing at the base, stipules usually 0. *Flowers* regular or irregular, hermaphrodite or polygamous, in simple or compound umbels, rarely in heads or whorls. The peripheral flowers sometimes rayed; umbels and unbellules each furnished with bracts or bracteoles or one or both naked. *Calyx-tube* adnate to the ovary, teeth 5 or 0. *Petals* 5, epigynous, sometimes unequal, often 2-fid with a median fold and inflexed apex, usually imbricate in bud. *Stamens* 5, epigynous, alternating with the petals; anthers versatile. *Ovary* inferior, 2-celled, crowned by the disc; ovules solitary, pendulous, anatropous; style 2, often dilated at the base into stylopods; stigmas capitellate. *Fruit* of 2 indehiscent dorsal or laterally compressed carpels (pericarps) separated by a commissure and attached to and often pendulous from a slender forked axis (carpophore); the

pericarps usually marked by 5 longitudinal ridges; and often traversed by oil canals (vittæ). *Seed* solitary in each carpel, pendulous; testa thin; albumen cartilaginous; embryo minute near hilum, radicle superior.

A very large family of no forest importance, but extensively represented in the province and contains many common economic plants namely :—

Carum copticum Benth., Vern. *Ajowan*, Hind.; *Jamain*, Sans.; *Jowan*, Beng.

Coriandrum sativum Linn., Vern. *Dhonya*, Hind.; *Dhane*, Beng.

Cuminum Cyminum Linn., Vern. *Zira*, Beng.

Fœniculum vulgare Gærtn., Vern. *Sonf*, Hind.; *Mohri*, Beng.; *Madhurica*, Sans.

Daucus Carota Linn., The carrot. *Gazar*.

Apium graveolens Linn., Celery.

Anethum Sowa Roxb. Dill.

Umbels simple :—

Carpophore 0 :—

- | | | | | |
|-------------------------|----|----|----|------------------------|
| Leaves undivided. | .. | .. | .. | 1. Hydrocotyle. |
| Leaves spinous toothed. | .. | .. | .. | 2. Eryngium. |
| Leaves 3-5 partite. | .. | .. | .. | 3. Sanicula. |

Umbels compound :—

Fruit laterally compressed :—

Leaves entire :—

- | | | | |
|--------------------------|----|----|----------------------|
| Flowers yellow or lurid. | .. | .. | 4. Bupleurum. |
|--------------------------|----|----|----------------------|

Leaves usually pinnate or decompound :—

- | | | | |
|----------------|----|----|------------------|
| Flowers white. | .. | .. | 5. Carum. |
|----------------|----|----|------------------|

Fruit widest at the commissure, circular or somewhat dorsally compressed in section, primary ridges distinct :—

- | | | | |
|--|----|----|-------------------|
| Fruit globose, ridges prominent, carpophore 2-fid or entire. | .. | .. | 6. Seseli. |
|--|----|----|-------------------|

Fruit ellipsoid or longer than broad, lateral primary ridges large, triangular, corky; carpophore 0.

- | |
|--------------------|
| 7. Ænanthe. |
|--------------------|

Fruit ovoid or subquadrate; lateral primary ridges winged, corky or papery, dorsal and intermediate ridges approximate; carpophore slender.

- | |
|--------------------|
| 8. Selinum. |
|--------------------|

Fruit much dorsally compressed, the mericarps flattened, the lateral ridges winged :—

- | | |
|--|-----------------------|
| Petals not radiant. Ovary glabrous. .. | 9. Peucedanum. |
|--|-----------------------|

1. HYDROCOTYLE Linn.

Hydrocotyle javanica Thunb. Vern. *Manamuni*, Garo.

A prostrate herb, rooting at the nodes. *Leaves* 1-3 in. across, rather broader than long, glabrous, shining above,

cordate crenate or shallowly lobed; petiole 5-7 in. long, laxly pubescent. *Umbels* many-flowered; peduncles leaf opposed. *Petals* entire. *Fruit* .08-.1 in. across, compressed, disk-like.

K. & J. HILLS, GARO HILLS (2-6,000 ft.).

Flrs. Rainy season. Fr. 9-10.

Hydrocotyle asiatica Linn. Vern. *Bor-mani-muni*, Ass.; *Brahma-manduki*, Beng.

A prostrate herb. *Leaves* sub-orbicular, reniform, .5-2.5 in. broad, almost glabrous except the nerves; petiole up to 5 in. long. *Petals* obtuse, imbricate; secondary ridges of fruit as distinct as primary.

SIBSAGAR.

Flrs. 4.

Hydrocotyle rotundifolia Roxb. Vern. *Haru-manimuni*, Ass.

A diffuse prostrate herb. *Leaves* small, orbicular, cordate, lobed or sub-entire, .25-.8 in. broad, hispid; petiole 1-5 in. long. *Petals* acute, valvate; secondary ridges of fruit 0.

SIBSAGAR.

Flrs. 4.

2. ERYNGIUM Linn.

Eryngium foetidum Linn. Vern. *Jongali-memedo*, Ass.; *Podomosolla*, Cach.

A very aromatic glabrous erect perennial herb. *Leaves* 2-4 by .4-1 in., spathulate, spinous-toothed. *Flowers* white in heads; bracts spinulose, stellate. *Calyx-teeth* ridged, acute. *Petals* white. *Fruit* ellipsoid. *Seed* semi-terete.

DARRANG, N. C. HILLS and K. & J. HILLS (upto 5,000 ft.).

Flrs. 5. Fr. Cold season.

3. SANICULA Linn.

Sanicula europæa Linn.

An erect herb. *Leaves* palmately 3-5-partite, glabrous. *Umbels* irregularly compound, rays few. *Flowers* mostly unisexual. *Calyx-tube* villous; teeth lanceolate. *Petals* white, emarginate. *Fruit* echinate, laterally compressed.

KHASI HILLS (3-5,000 ft.).

Flrs. 12-1. Fr. 3.

4. BUPLEURUM Linn.

Bupleurum falcatum Linn.

Soft-wooded glabrous undershrub. *Radical leaves* linear, broader upwards. *Cauline leaves* linear-lanceolate, acute, upto 5 in. long, semi-amplexicaul or sessile. *Umbels* compound. *Calyx-teeth* 0. *Petals* obovate, emarginate. *Fruit* brownish; carpels narrowly oblong, furrows 3-vittate.

KHASI HILLS (3-6,000 ft.) G. Mann.

Flrs. 6.

5. CARUM Linn.

Carum khasianum C. B. Clarke.

A pubescent erect herb 2-4 ft. *Lower leaves* 3-partite or sub-bipinnate; segments oblong, arcuate, serrate. *Umbels* compound. *Flowers* white, polygamous; bracts linear. *Fruit* ovoid, hispidulous, ridges prominent; carpels sub-pentagynous; carpophore 2-fid; vittæ solitary. *Seed* terete, dorsally subcompressed.

KHASI HILLS, 3-5,000 ft. (G. Mann).

Flrs. 6.

6. SESELI Linn.

Seseli daucifolium C. B. Clarke.

An annual erect herb. *Leaves* 2-3-pinnate, alternate segments linear or narrowly lanceolate, margins minutely serrulate. *Umbels* compound. *Flowers* white. *Calyx-teeth* obsolete. *Petals* 5, emarginate; carpels 2; style usually short. *Fruit* glabrous, globose. *Seed* semi-terete.

ASSAM (G. Mann).

7. ÆNANTHE Linn.

Ænanthe stolonifera Wall.

A stoloniferous herb, growing in wet places. *Leaves* 1-2 pinnate or 3 partite. *Umbels* compound, rays 6-30. *Flowers* white. *Calyx-teeth* small. *Petals* emarginate. *Fruit* subquadrate, commissure broad, lateral ridge large,

triangular corky, furrows 1-vittate; carpophore 0. *Seed* almost rounded.

KHASI HILLS up to 6,000 ft.

Flrs. 3. Fr. 10.

Ænanthe benghalensis Benth.

A herb growing in moist places almost glabrous, usually erect. *Leaves* pinnately de-compound. *Peduncles* 2·2·5 in. *Seeds* nearly rounded.

K. & J. HILLS (9458 Fisher 1879).

Ænanthe linearis Wall.

A straggling herb, almost glabrous; nodes often rooting. *Leaves* bipinnate. *Peduncles* about 5·5 in. long. *Seeds* almost circular.

K. & J. HILLS (9303).

There is another sheet of *Ænanthe* (Mann No. 372 K. & J. Hills—3·4,000 feet, June 1876) which appears to be intermediate between *O. hookeri* and *O. linearis*.

8. SELINUM Linn.

Selinum striatum Benth. Vern. *Jakseh*, Khasi; *Bhutkis*, Nep.

Perennial herbs, glabrous or nearly so. *Leaves* 4·8 in., oblong lanceolate, or ovate, 3·4-pinnate, upper-most sheath often exceeding the whole length of the petiole. *Fruit* dorsally compressed, ridges subequally winged; vittæ solitary. *Seeds* obscurely 2-grooved.

KHASI HILLS, 4·6,000 ft. Common.

Flrs. 6·7. Fr. Early cold season.

9. PEUCEDANUM Linn.

Peucedanum ramosissimum Wall.

Perennial glabrous herbs. *Leaves* 2·4-pinnate; segments of lower leaves ovate lanceolate of the upper narrow lanceolate. *Umbels* compound, rays usually numerous. *Calyx-teeth* minute. *Petals* obovate. *Ovary* glabrous; style very short. *Fruit* much dorsally compressed, mericarps slightly convex on the back, margin more or less acutely winged,

dorsal and intermediate ridges obscure, furrows 1-vittate, Commissure evittate.

K. and J. HILLS (4-6,000 ft.).

Flrs. Rainy season. Fr. 9.

Heracleum candicans Wall.

A large erect herb. *Stem* hollow, almost glabrous; young parts pubescent. *Leaves* bipinnate. *Leaflets* lobed, doubly serrate or crenate. *Fruit* obovate, about .4 in. long, commissure 2-vittate.

K. & J. HILLS (10576).

Heracleum obtusifolium Wall.

An erect herb, hairy. *Leaves* 3-fid or 3-5 partite, tomentose beneath. *Fruit* obovate, .2 in. long, 4-vittate.

K. & J. HILLS 6,000 ft. (9458).

FAM. 68. ARALIACEÆ.

Trees or shrubs, rarely herbs, erect or climbing, sometimes epiphytic. *Leaves* alternate or whorled, simple or compound; petiole usually long; stipules adnate to the petiole, sometimes conspicuous or absent. *Flowers* regular, small, sometimes polygamous, usually umbellate, less often racemose or in paniced heads; bracts and bracteoles present; pedicels sometimes jointed. *Calyx-tube* adnate to the ovary; limb truncate, obsolete or with small teeth. *Petals* 5, rarely 6-7, free or falling off in a cap. *Stamens* usually 4, alternating with the calyx lobes, rarely many, inserted round an epigynous disk. *Ovary* inferior, 2 or more celled; ovule 1 in each cell, pendulous. *Fruit* a drupe or berry; seeds pendulous, albuminous.

- I. Stamens less than 15; petals not connate;
ovary 2-12 celled :—

- A. Ovary 2-5 celled. Pedicels jointed;
petals imbricate in bud, albumen
uniform.

1. **Aralia.**

B. Ovary 5 celled :—

1. Leaves not simple :—

Petals imbricate in bud; leaves usually pinnately compound*; pedicels jointed.

2. **Pentapanax.**

Petals valvate, 5 or 6; leaves digitate; pedicels not jointed.

3. **Heptapleurum.**

2. Leaves simple :—

Erect trees or shrubs; albumen uniform.

4. **Dendropanax.**

Evergreen creeper climbing by adventitious roots; albumen ruminant.

5. **Hedera.**

C. Ovary 2-celled :—

1. Pedicels not jointed :—

Styles distinct :—

Unarmed trees; leaves pinnately decomposed; albumen ruminant.

6. **Heteropanax.**

Armed trees; leaves digitate; albumen uniform.

7. **Acanthopanax.**

Styles united :—

Generally armed trees or shrubs; albumen ruminant.

8. **Brassaiopsis.**

2. Pedicels jointed :—

Styles united; leaves digitate; albumen uniform.

9. **Macropanax.**

D. Ovary 6-12 celled :—

Leaves palmate; flowers large; pedicels not jointed.

10. **Trevesia.**

II. Stamens usually numerous; petals connate and falling off in a cap. Ovary of numerous cells.

11. **Tupidanthus.**

I. ARALIA Linn.

Herbs, shrubs, or small trees. *Leaves* digitate, pinnate or pinnately decomposed; stipules not prominent. *Umbels* solitary or in racemes or panicles, rarely compound; pedicels sometimes jointed under the flowers. *Flowers* often polygamo-monœcious. *Calyx-limb* 5-toothed or truncate. *Petals* 5, ovate, imbricate in bud. *Stamens* 5. *Ovary* 2-5-celled; styles 2-5, free or shortly connate at base. *Fruit* 4-5-celled, 4-5 angular, or sub-globose, 2-3-celled.

1. Erect shrubs. Leaves 1-3 pinnate; styles 4-5 :—
 - a. Inflorescence softly brown tomentose throughout; bracts tomentose, persistent, upto .25 in. long; pedicels tomentose. 1. *A. Thomsonii*.
 - b. Inflorescence pubescent towards the top only; pedicels hairy; bracts caducous. 2. *A. armata*.
 - c. Inflorescence and pedicels glabrous; bracts membranous, upto 1 in. long, glabrous. 3. *A. foliosa*.
2. Herb. Leaves digitate; styles 2-3. .. 4. *A. pseudo-ginseng*.

1. *Aralia Thomsonii* Seem. Vern. *Dieng-sir-ah*, Kh.

Usually unbranched prickly shrub, younger parts, inflorescence, leaf rachis and leaflets softly fulvous tomentose. *Prickles* usually short, strong, weaker on pinnæ. *Leaves* large, 2-3 pinnate, with a pair of leaflets at each division of the rachis, pinnæ 4-5 pairs; leaflets 5-11 on each, pinnate, 3-5 by 1·2-3 in., ovate or ovate-lanceolate, acuminate, serrulate, often unequal, scabrid above, tomentose beneath; lateral nerves 6-10 on either side of midrib, arcuate; base subcordate or rounded; petiolules 0·1 in. long. *Umbels* panicked; panicles 18-36 in. long; umbels .6·8 in. across. *Bracts* .2·25 in. long, lanceolate or narrow lanceolate; bracteoles similar but smaller; pedicels .2·4 in. long, tomentose, jointed towards the top. *Calyx* glabrate; teeth distinct. *Petals* ovate. *Style* arms 5, often 4 by fusion of two. *Fruit* .15 in. long, deeply ribbed.

GOALPARA, KHASI & JAINTIA HILLS 2-5,000 ft., Haflong—CACHAR—Craib.

Flrs. 2-6. Fr. 6-8.

2. *Aralia armata* Seem. Vern. *Santok-arong*, Mik.; *Thing-chuk-chu*, Kuki; *Dieng-la-tymphu*, Synt.

A shrub or a small prickly tree with large pith. *Bark* grey; blaze white. *Leaves* very large, 3-4 pinnate, often up to 7 ft. long; rachis and its ramifications armed with short prickles; primary pinnæ 6-8 pairs, secondary 3-8 pairs, sometimes with a hair of small pinnæ at the base; leaflets 5-9 on the ultimate pinnules, also often a hair at the ramifica-

tion of the rachis, 2·5-4·5 by ·7-2 in., ovate or ovate-lanceolate, acuminate, bristly serrulate; base rounded or cordate, pilose or harshly hairy with short stiff hairs; lateral petiolules very short, hairy. *Flowers* small, whitish, about ·15 in. across in extensive paniced umbels; panicles much branched (terminal), upper portion hairy; umbels up to 20-flowered; bracts caducous; pedicels roughly hairy up to ·5 in. long. *Calyx* nearly glabrous; teeth distinct. *Petals* 5, imbricate in bud. *Stamens* 5; ovary 4-5 celled; styles free, recurved. *Fruits* the size of pepper-corns, glabrous, 4-5 celled with as many stones.

CACHAR and KHASI HILLS, 2-4,000 ft.

Flrs. 11-12. Fr. 1.

3. *Aralia foliolosa* Seem.

A large shrub or a small tree, armed with numerous spreading prickles. *Leaves* pinnately decompose, about 5 ft. or more in length; rachis glabrous; prickles distant, up to ·3 in. long, often with a pair of leaflets at the ramifications. *Leaflets* on the ultimate pinnules 3-9, terminal largest, 3-5·5 by 1-2 in., ovate-lanceolate or oblong, acuminate or caudate-acuminate, serrulate, glabrous or with minute bristles on the nerves; base cordate or rounded; lateral petiolules short 0-·15 in. long. *Panicles* very large, decompose, 1-3 ft. or more in length, pilose when young, ultimately glabrous with a few weak prickles, scattered; bracts narrow-oblong to oblong-lanceolate, up to 1 in. long; membranous, persistent; pedicels glabrous or nearly so, up to ·45 in. long, very slender with a ring of minute sets at the apical joint. *Flowers* 5-merous, about ·15 in. across, greenish. *Calyx* glabrous; teeth distinct; petals valvate, ovate. *Fruit* of 5-carpels with 5 ridges about ·15 in. long.

KHASI HILLS, Griffith 2659! Nongpoh forest, ASSAM, Jenkins.

Fr. 12.

4. *Aralia Pseudo-ginseng* Benth.

A herb attaining about 2·5 ft. with perennial tuberous or tuberiferous root stock. *Leaves* digitate; petiole 2-6·5 in. long. *Stem* terminated by a whorl of leaves with a deciduous

scale at the base. *Leaflets* 3-9, often 5, 4·2-7·25 by ·6-·85 in., narrowly lanceolate, acuminate, serrate, membranous, covered with scattered bristly hairs on both surfaces; lateral nerves slender, many; base tapering or rounded; petiolules 0·3 in. long. *Peduncles* glabrous or puberulous, simple or 2-4 branched, each branch terminating in an umbel; pedicels ·25-1 in. long, puberulous or pubescent, jointed below the flowers; bracteoles deciduous. *Flowers* polygamo-monœcious. *Calyx* more or less puberulous with short teeth. *Ovary* 2-3-celled; styles 2-3. *Fruit* drupaceous, ·25 in. across, black when ripe, bluntly 2-3-gonous and shallow grooved between the angles.

KHASI HILLS 5500-6500 ft. Usually in shady situations e.g. Dumpep, where it is sometimes gregarious.

Flrs. 5-6. Fr. 9.

2. PENTAPANAX Seem.

Trees or shrubs, often scandent. *Leaves* 1-pinnate, with 3-9 leaflets, glabrous. *Flowers* bisexual, rarely polygamous, in compound racemes or umbels; pedicels jointed close under the flower. *Calyx-teeth* 5; petals 5, imbricate in bud. *Stamens* 5. *Ovary* 5 (or 4)-celled; styles 4-5 combined to the top or free or more than half the length. *Fruit* 4-5 celled or angled; albumen uniform.

1. Flowers in paniced racemes :—

Rachis of panicles unbranched upwards. 1. *P. subcordatum*.

Rachis of panicles bearing racemes to nearly the top. 2. *P. racemosum*.

2. Flowers in umbels :—

Leaflets serrate. 3. *P. Leschenaultii*.

Leaflets entire. 4. *P. parasiticum*.

1. *Pentapanax subcordatum* Seem. Vern. *Dieng-jariat*, *Dieng-soh-baria-um*, *Jariat-lor-mew*, *Ja-riat*, Kh.

A small tree, epiphytic at least in early life. *Bark* greyish-brown outside, exfoliating in irregular flakes, about 3 in. thick; blaze white or cream coloured. *Leaf rachis* 5-9 in. long; common petiole 3-6·5 in. long. *Leaflets* 3-5, 3·5-5 by 1·5-3·5 in., ovate, ovate-oblong or elliptic, shortly caudate-acuminate; sinuate-crenate, glabrous, sub-coriaceous;

main lateral base subcordate or subtruncate, often abruptly narrowed on the petiolule; nerves 6-10 on either half; petiolules $\cdot 5\text{--}1\cdot 7$ in. long, jointed at or near the top. *Flowers* very small, green in paniced racemes. *Panicles* terminal or from below the current year's shoots, 8-11 in. long, often with 3-8 strong ascending branches from the lower half, racemes borne on the lower portion of the main panicle branches, upper portion of rachis unbranched. *Racemes* $1\cdot 5\text{--}4$ in. long, flowering down to the bases; pedicels $\cdot 1\text{--}\cdot 2$ in. long, each with a minute linear bract at the base. *Flowers* bisexual, very small, greenish. *Styles* combined nearly to the top. *Fruits* about $\cdot 2$ in. across, subglobose, obscurely 5 angled.

Wood white, not used.

Flrs. 5-6. Fr. 7.

2. *Pentapanax racemosum* Seem.

Straggling or a small erect tree. *Leaves* 12-20 in. long, pinnately 3-5 foliolate; leaflets 2-5 by $1\cdot 2\text{--}3\cdot 5$ in., ovate-acuminate, distinctly cuspidate-serrate, glabrous; main lateral nerves about 5 on either half; lateral petiolule $\cdot 1\text{--}1$ in. long. *Flowers* unisexual, small, in terminal clustered panicles 6-9 in. long; racemes $1\cdot 5\text{--}2$ in. long, nearly to the top of the panicle branches, bractiate; pedicels $\cdot 08$ in. long, slender. *Styles* in female flowers recurved, in male flowers combined to nearly the top. *Fruit* subglobose.

KHASI HILLS—Brandis. There is no record from our area at Calcutta.

Flrs. 6-7.

3. *Pentapanax Leschenaultii* Seem. Var. *umbellatum* Seem.

An unarmed small tree or subscandent shrub, sometimes epiphytic, often trailing on rocks. *Leaf rachis* 5-9 in. long; common petiole 3-6 in. long. *Leaflets* 3 or 5, $2\cdot 5\text{--}4\cdot 5$ by 1-2 in., ovate or lanceolate, sharply acuminate, bristle serrate or serrulate, rounded or subtruncate and often unequal at the base, shining above, subglaucous beneath; main lateral nerves 6-9 on either half; petiolules (of lateral leaflets) $\cdot 2\text{--}1$

in. long, jointed near or at the apex. *Flowers* about .15 in. across, greenish, in peduncled umbels, arranged on a panicle or compound umbel, 2.5-5.5 in. long. *Umbellules* globose; peduncles .5-2 in. long. *Branches* of the inflorescence and pedicels pubescent or puberulous; pedicels slender, usually .3-.6 in. long, sometimes longer. *Bracts* deciduous, narrow-lanceolate. *Calyx* glabrous; disk often conically elongated. *Fruit* about .17 in. long, oblong, sharply 5-ribbed with deep grooves between, crowned by the remains of the style.

KHASI HILLS 5-6,000 ft.

Flrs. 3-4. Fr. 7-8.

The type of the tree with fruits, without prominent ribs and umbels arranged in panicles and does not occur in our area.

4. *Pentapanax parasiticum* Seem. Var. *khasianum* C. B. C.

An epiphytic subscandent shrub or small tree with smooth pale or brownish bark, often sending down stout ærial roots. *Leaves* 4-10 in. long. *Leaflets* 5; 1.5-3 in. by .7-1 in., ovate-lanceolate, entire, acuminate; base rounded or subacute, often unequal, subcoriaceous, shining above, glaucous beneath; lateral nerves very slender; lateral petiolules 0-.1 in. long. *Flowers* greenish, .25 in. across in globose umbels; solitary or 2-8 together in simple panicles. *Pedicels* .3-.5 in. long, slender, pubescent. *Styles* combined to the apex. *Fruit* subglobose.

KHASI HILLS—5,000 ft., rare.

Flrs. 10.

***Panax fruticosum* Linn.** A shrub 3-6 ft. high with 3-pinnate leaves; leaflets 2-3 by .5-.25 in., very variable, lanceolate, bristle-serrate. Flowers very small, yellow, 5-merous in paniced umbels; bracts minute; pedicels jointed close under the flowers .12-.2 in. long. *Styles* 3, persistent, recurved. *Fruit* compressed laterally, .15 in. across.

Often cultivated as an ornamental pot plant in verandahs.

3. HEPTAPLEURUM Gærtn.

(Included in *Schefflera* Forst Section-Heptapleurum by Harms in Englers Nat. Pflanzenfamilien).

Large shrubs or trees, sometimes scandent; prickles absent. *Leaves* usually digitate, rarely 1-foliolate or twice digitate; leaflets entire or remotely toothed or sometimes lobed, coriaceous; stipules often connate within the petiole and prominent. *Flowers* often polygamous, usually 5-6, sometimes 10-merous; umbels paniced or in compound racemes; bracts woolly; pedicels not jointed under the flower; bracteoles 0 or few and caducous. *Calyx* margins toothed or truncate. *Petals* valvate, often cohering in a cap, which is raised by the stamens. *Stamens* and ovary cells as many as the petals; disk small or large; styles short or sometimes scarcely developed, connate in a broadly conical or narrow cylindric column. *Fruit* sub-globose, 5-6 angled. *Seeds* compressed; albumen uniform, rarely ruminant.

- I. Fruit crowned by a narrow cylindric column :—
 Leaflets polymorphous, often pinnately lobed. 1. *H. hypoleucum*.
 Leaflets not polymorphous. 2. *H. elatum*.
- II. Fruit crowned by a conical disk; styles very short :—
 Leaflets entire :—
 Nerves indistinct above on leaflets; inflorescence covered with deciduous tomentum; ridges on the fruit rounded. Leaf scars not annulate. . . 3. *H. kahasianum*.
 Nerves distinct above on leaflets; inflorescence glabrous; ridges on the fruit sharp. Leaf scars annulate. . . 4. *H. venulosum*.

1. *Heptapleurum hypoleucum* Kurz. Vern. *Dieng-la-tymphu*, Synt., Kh.

A small unarmed branchy tree. *Bark* nearly smooth, brown or grey, with a soft greenish-white cut; young parts and inflorescence with deciduous brown stellate scurf. *Leaves* digitate; common petiole 12-26 in. long, swollen at the base; stipules connate with acuminate tips, brown felted outside, .3-.5 in. long. *Leaflets* polymorphic, 5-7, very variable in size, 5-15 by 1.5-12 in., central largest, usually oblong or elliptic to ovate oblong in outline, acuminate, pinnately lobed, entire or somewhat distantly serrate, glabrous with age above, undersurface paler with deciduous

scurf and stellate hairs, sometimes glabrescent with age; chartaceous; main lateral nerves 8-14 on either half; petiolule 1-7 in. long, jointed and thickened at the apex. *Flowers* greenish-white, globose; umbels terminating (by the abortion of the lateral umbels) or arranged racemosely on the branches of a terminal subcorymbose panicle, 10-24 in. long; terminal umbels largest, 1·5-2 in. across; lateral umbels with peduncles. *Rachis* stout; panicle branches 1-6·5 in. long; bracts at the base of the peduncles thick, concave, ovate, acuminate, densely brown-felted- gradually small upwards up to 1 in. long; bracteoles similar, but small, a few at the base of pedicels, linear; pedicels ·5-·75 in. long. *Calyx* truncate. *Petals* 5, ultimately reflexed, ·2-·25 in. long, oblong-acute, clothed outside with dense stellate white wool. *Stamens* 5; filaments subulate, much exceeding the petals. *Fruit* globose, ·25 in. across, 5-celled, obtusely 5-ribbed, crowned by the disk and the short column of connate style, which is 5-fid at the apex; albumen ruminant.

KHASI HILLS 2-6,000 ft.

A poultice of leaves is good for swellings.

Flrs. 11-1. Fr. 4.

2. *Heptapleurum elatum* C. B. Clarke. Var. *Griffithii*, Syn. *H. glaucum* Kurz.

A small evergreen tree; young parts and inflorescence felted with deciduous tawny floccose wool, glabrescent with age. *Leaves* digitately 5-7 foliolate; common petiole stout, 12-19 in. or longer; stipules connate, about ·5 in. long. *Leaflets* variable in size, usually 5-10 by 2-5 in., elliptic to oblong or ovate, obtuse or rounded at the base, entire, acuminate or remotely serrate, coriaceous, glabrous above, at first stellate tomentose, ultimately glabrescent, but pale beneath; lateral nerves 8-12 on either half; petiolules 1-3 in. long. *Flowers* small, in umbels terminating or racemosely arranged on, the branches of a terminal corymbose panicle, usually not exceeding the common petioles in length; bracts up to ·6 in., smaller upwards, concave, ovate-acuminate, with a broad suborbicular base; bracteoles small, similar in shape; pedicels woolly, ·5-·7 in. long. *Calyx* truncate. *Petals* 5, stellate-woolly outside, glabrous inside, oblong, acute, about

·2 in. long. *Styles* united in a column, distinctly 5-fid at the top. *Fruit* globose, about ·25 in. across, glabrous with age, 5 grooved, surmounted by the persistent cylindric style.

KHASI HILLS 4-6,000 ft. Mann.

The type has usually glabrous or sparingly woolly buds, pedicels and petals. An incomplete specimen (No. 445) from an epiphyte collected at Dirju along Kananoi in Lakhimpur Dist., with large leaves 9-13 by 4-7 in., elliptic-oblong, short, acuminate, entire, glabrous leaves, may be a form of the plant, but the material is too fragmentary for satisfactory determination.*

Fr. 12.

Heptapleurum glaucum C. B. Clarke (not of Kurz.)

A small tree with stout branchlets. *Leaves* digitately 3-7 foliolate; common petiole 8-10 in. long. *Leaflets* 3-6 by 1-3 in., lanceolate to obovate lanceolate, entire or nearly so, glabrous above, pale and floccose tomentose when young along the nerves, ultimately glabrous beneath; lateral nerves 10-12 on either half; petiolules ·8-2 in. long. *Inflorescence* scurfy tomentose; panicles branched as in *H. elatum*, 6-8 in. long; branches 1-3 in. long; umbels about 1 in. across; pedicels ·25-·4 in. long. *Calyx* and *petals* brown-woolly-tomentose outside. *Fruit* glabrous, about ·25 in. across, 5-grooved, surmounted by the persistent style.

Jowai—King's collector! "Vale of rocks—KHASI HILLS—C. B. Clarke! Kynohi."

The plant is scarcely separable from the last species.

Flrs. 10-11. Fr. 12.

3. Heptapleurum khasianum C. B. Clarke. Vern. *Dieng-tampoh*, *Dieng-la-tang-king*, *Dieng-tanki*, Kh.

A small tree branched from near the base. *Bark* grey or brown, with distant warts, somewhat corky; blaze yellowish or greenish white with faint brown or green dots, darkening and soon changing to greenish-black on exposure; young shoots and inflorescence clothed with deciduous, stellate tomentum. *Leaves* digitately 7-9 foliolate; common petiole 7-10 in. long, lenticellate, usually with many close set warts at insertions; stipules connate; leaflets with a faint resinous smell, 4-9 by 1·5-3·5 in. (sometimes attaining 11 in. C. B. Clarke in F. B. I.), lanceolate or elliptic-lanceolate, acuminate, entire; glabrous, shining above, very coriaceous; main lateral nerves 10-15 on either half, joined near the margin by an

* Since identified at Sibpur as *H. hypoleucum* Kurz.—R. N. De.

undulating intramarginal nerve, indistinct above; base rounded or narrowed; petiolules 1-2 in. long; umbellules up to 10 flowered, recemed on the branches of a terminal or subterminal spreading corymbose panicle, 9-12 in. long. *Panicle* branches ascending, 2.5 in. to nearly as long as the rachis; peduncles .3-.9 in. long. *Flowers* white. *Calyx* at first stellate-tomentose, ultimately glabrous, truncate; petals deciduously stellate pubescent outside, .15 in. long, usually 6, less often 7 or 8? *Stamens* as many as petals. *Fruit* 6-8 grooved, globose, .2 in. long, crowned by the conical disk. *Styles* very short, not connate into a cylindric column; albumen not ruminant.

KHASI HILLS—4-6,000 ft., sometimes on rocks in shady situations, rarely epiphytic.

Flrs. 12.

4. *Heptapleurum venulosum* Seem. Syn. *Schefflera venulosa* Ham. Vern. *Jeng-jil*, *Dorengmi*, Garo; *Dau-nasi*, Mech; *Daini-huka*, Jharua; *Jokhuni-hata*, *Dhobailata*, *Dhovallata*. Ass.; *Dieng-meising-hat*, *Jarmi-mong-boi*, *Dieng-soh-luait*, *Mei-soh-syrkan*, Kh.; *Tille-diyabet*, Synt.

A soft wooded climber attaching itself by means of adventitious roots to supports, rarely a shrub, often epiphytic. *Bark* conspicuously lenticellate, nearly white or pale brown; thick, nearly white or pale yellow, mottled with darker yellow or orange inside; twigs stout. *Leaves* digitate; petiole terete, 4.5-12 in. long; stipules connate, .5 in. long; leaflets 3-7, .3-7.5 by 1-3.5 in., elliptic-oblong or lanceolate-acuminate, entire, coriaceous, glabrous, shining above; lateral nerves about 5-7 on either side; petiolules 1-2 in. long, jointed at the apex. *Flowers* .3 in. across, polygamous, in few flowered (up to 12) umbellules, racemosely arranged on a much branched terminal panicle; rachis purplish; peduncles of umbellules up to .5 in. long; pedicels up to .2 in. long; panicle branches 5-10 in. long; bracts caducous, woolly, enveloping the umbellules. *Calyx* truncate. *Petals* 5, obovate-oblong, acute, in male flowers sometimes cohering in a cap which is uplifted by the stamens. *Fruit* about .3 in. across, 5 ridged.

DARRANG, KAMRUP, SIBSAGAR, NOWGONG, CACHAR, GOALPARA, GARO AND KHASI HILLS—ascending to about 4,000 ft. Probably all over ASSAM.

Flrs. 3-4. Fr. 10-11?

The leaf scars persist on the twigs as nearly annulate raised lines.

The form with large leaflets has been separated under Var. *macrophylla* Wall. Cat. (sp.) in F. B. I.

Schefflera bengalensis Gamble Kew Bulletin 1919. P. 229.

Climbing shrub. *Leaves* digitately 5-foliolate; petioles 4-8 in. long. *Leaflets* 3-8 in. by 1-2-2-75 in., oblong to oblong-lanceolate, cuspidate-acuminate; main lateral nerves about 8-10, curved at the margin; petiolule .75-2 in. long; stipules intrapetiolar, rounded, fleshy. *Flowers* dull red in umbels on terminal paniced racemes; rachis usually stout, glabrous, 3-4 in. long; racemes 4-4-75 in. long; peduncles of umbels .4-8 in. long; pedicels slender; bracts in bud large, orbicular, floccose—puberulous, soon deciduous. *Calyx-tube* glabrous, truncate. *Corolla* falling off in a calyptra; petals about .08 in. long. *Ovary* 5-celled. *Fruit* dry, 5-angled, glabrous.

Griffith 2692 from Bhotan; KHASI HILLS and SYLHET, Hooker, Thomson and Simmons.

Allied to *Heptapleurum venulosum* Seem Var. *Roxburghii*-*Schefflera Roxburghii* Gamble.

4. DENDROPANAX Dcne and Planch.

Dendropanax japonicum Seem. Vern. *Dieng-sar-rat-ed*, Synt.

A small unarmed tree with smell of as a foetida. *Bark* grey, not rough; blaze white. *Leaves* on young plants and coppice shoots deeply palmatifid with 5-8 narrow-lanceolate, entire or remotely and minutely toothed lobes, 5-10 in. across with petioles 6-15 in. in length, in older plants 3-6 by 1-2 in., elliptic-lanceolate or lanceolate, subacute to acuminate, entire, glabrous, chartaceous; lateral nerves 4-6 on either side, not prominent; petiole .5-3 in. long. *Flowers* light-green in umbels; umbels solitary or few on short terminal panicles; peduncles .5-7 in. long; pedicels not articulate, .3-5 in. long. *Calyx-limb* with 5 minute teeth or nearly entire, about .15 in. long. *Petals* 5, about .1 in. long, valvate, reflexed, thick, lanceolate to ovate. *Stamens* 5; filaments exceeding the petals. *Ovary* 5-celled; styles united at the base into a column, their summits free and spreading. *Fruit*

ellipsoid, .3-.5 in. by .25-.3 in., ribbed, 5-celled; seeds compressed; albumen uniform.

KHASI HILLS, 4-5,000 ft.

Flrs. 9.

Dendropanax Listeri King. Journ. of Asiatic Soc., Beng. Vol. XLVII, 294.

A small straggling tree up to 20 ft. in height. *Leaves* 1-foliolate, 4-8 by 2-4 in., elliptic or ovate, acuminate; base cuneate with 3 strong nerves and a slender one on either side, entire or distantly cuspidate-serrate, subcoriaceous; lateral nerves 2-3 on either half above the basal, arched; petiole 1.5-9 in. long. *Panicles* terminal, pyramidal, 6-9 in. long with branches 2-6 in. long; pedicels .3-.5 in. long, slender. *Flowers* not seen. *Fruit* globose, .15-.2 in. across.

Fr. 1-2.

DAFFLA HILLS, 4500-5,000 ft.

5. HEDERA Linn.

Hedera Helix Linn. The Ivy. Vern. *Mei-peosree*, *Mei-soh-poram-shre*, *Peu-shri*, *Peu-shrish*, Kh.

A large evergreen woody climber adhering to trees, rocks etc. by numerous fine rootlets. *Bark* light, nearly white or pale brown, somewhat rough, cut yellowish white. *Leaves* alternate, simple, polymorphic, usually 2-5 in. long, very variable in breadth, on flowering shoots usually entire and ovate, ovate-elliptic or lanceolate, others variously lobed, more or less triangular in outline, leathery, dark green and shining above, 3-5 nerved; nerves prominent above; base cordate, rounded or in flowering shoots narrowed or cuneate; petiole slender, .5-3.5 in. long; stipules 0. *Flowers* about .25-.4 in. across, polygamous, yellowish-green, pentamerous in pedunculate globose umbels, which are terminal, solitary or a few together in short subcorymbose panicles; .5-2 in. long; pedicels .5-.8 in. long, both clothed with minute stellate scales. *Calyx* obscurely toothed or nearly truncate. *Petals* about .12 in. long, triangular, valvate with a ridge in the centre inside, ultimately reflexed. *Ovary* 5-celled; disk broadly conical; styles connate in a short column. *Fruit* .25-.3 in. across, globose, yellow, shining when fully ripe,

with fleshy exocarp, pyrenes thin-walled; seeds 3-5, ovoid; albumen ruminant.

KHASI HILLS, 3-6,500 ft.

Flrs. 10-12. Fr. 1-6.

6. HETEROPANAX Seem.

Heteropanax fragrans Seem. Vern. *Kainsra-asing*, *Kanjor-arong*, Mik.; *Gutang-asing*, *Galapak-asing*, Abor; *Keseru*, *Karangiya*, (Kamrup), *Koronda*, Ass.; *Ralung-bu*, Kuki; *Katebel*, Tipp.; *Bolsamphol*, *Bigasargo*, *Mugasalgo*, Garo; *Dieng-kynjar*, *Dieng-mangala*, *Dieng-sohtang-pu*, Kh.

A small soft wooded evergreen tree; bark nearly white to dark grey, rugose, about .5 in. thick, soft and pale to greenish with brown strands inside. *Leaves* enormous up to 4 ft. long, tripinnate, rarely 4-pinnate; rachis often with a pair of leaflets at the nodes, dilated at the base; leaflets 3-5.5 by 1.5-3 in., elliptic, elliptic-ovate or lanceolate, usually short acuminate, entire; base often narrowed and unequal, glabrous, subcoriaceous; main lateral nerves 5-9 on either half, somewhat distant, arcuate, upper often meeting in intramarginal loops; petiolules almost 0.5 in. long. *Flowers* about .2 in. across, polygamous, yellow, fragrant, subsessile or shortly pedicellate in dense subglobose umbels, up to .7 in. across, racemed on the branches of an enormous panicle, 1.5-3 ft. long; flowers and inflorescence covered with more or less rusty, stellate scurf or tomentum. *Bracts* small, concave, persistent; pedicels short, up to .1 in. long, enlarging to .25 in. in fruit, not jointed below the flower. *Calyx* turbinate, nearly truncate. *Petals* 5, valvate, acute. *Stamens* 5, extruded, spreading. *Ovary* 2-celled; styles 2, distinct, persistent and recurved in fruit. *Fruit* compressed at right angles to the septum, .2-.3 by .3-.4 in., glaucous, ultimately glabrescent; endocarp crustaceous; seeds 2, orbicular, compressed with ruminant albumen.

All over the province ascending to about 3,500 ft. Eri silk worms are fed on the leaves.

Flrs. 12-1. Fr. 3-4.

The bisexual flowers are generally pedicellate and borne at ends

of panicle branches, the male flowers are subsessile and usually borne lower in smaller subcapitate umbels.

7. ACANTHOPANAX Dene.

Acanthopanax aculeatum Seem. Vern. *Kenkut*, *Chobolaksinriube*, *Tako-laksim*, Miri; *Shi-soh-sat-khlaw*, *Shiah-ryng-khwari*, Kh.

A prickly straggling or scandent glabrous shrub. *Leaves* digitately 3-5 foliolate; common petiole 1-2·7 in. long, slender, often with 1 or more prickles; base stem clasping. *Leaflets* 1-4 by ·5-1·7 in., lanceolate to elliptic or oblanceolate, acuminate, unequally cuspidate-serrate or denticulate; base attenuated to the short petiolule, thin; main lateral nerves 5-7 on either half, slender, arcuate, sometimes with a few weak prickles on the upper surface; petiolules ·1-·25 in. long, margined. *Flowers* in globose umbels, which are solitary and axillary or terminal and arranged in corymbose or subumbellate panicles; bracts about ·1 in. long, concave, acute; peduncles ·7-2 in. long, not jointed; bracteoles many at the base of the pedicels. *Calyx-teeth* 5, small. *Petals* 5 or 4, lanceolate, acute, about ·1 in. long. *Stamens* as many as the petals. *Ovary* 2-celled; styles 2 at the apex of the conical disk, persistent, lower halves combined; upper halves free and ultimately recurved. *Fruit* ·2 in. across; albumen uniform.

N.-E. FRONTIER, LAKHIMPUR, DARRANG, SIBSAGAR, KHASI HILLS—ascending up to 4,000 ft.

Flrs. 11.

8. BRASSAIOPSIS Dene and Planch.

Large shrubs or trees often armed. *Leaves* digitate or palmately lobed or angled; stipules connate within the petiole not prominent. *Flowers* often polygamous, pentamerous in umbels, which are arranged in large compound panicles, stellate tomentose at least when young; bracts often persistent; pedicels surrounded at the base by a dense cluster of persistent bracteoles, not jointed under the flowers. *Petals* valvate. *Ovary* 2-celled; styles united, long or short. *Fruit* broadly globose or turbinate, 2 or by abortion 1-seeded. *Seed* not compressed; albumen ruminant.

I. Leaves digitately compound :—

Leaflets glabrate, entire or distantly serrulate; petiolules up to 2 in. long.

Leaflets thinly clothed with stiff stellate hairs, sharply serrate; petiolules short, up to 3 in. long. Prickles sharp.

1. *B. speciosa*.
Var. *typica*.

2. *B. aculeata*.

II. Leaves pinnately divided or angled :—

A. Leaflets serrate, undersurface thinly pubescent.

3. *B. mitis*.

B. Leaflets nearly entire, undersurface scurfy.

4. *B. palmata*.

C. Leaflets entire or serrate, woolly tomentose beneath.

5. *B. Hookeri*.

1. **Brassaiopsis speciosa** Dcne. & Planch. Vern. *Kurila* Ass.; *Dieng-lakor*, *La-tyng-krong*, *Dieng-la-tymphu*, Kh.; (a common Khasi name for all araliaceous plants with digitate leaves); *Tong-bahu*, Naga; *Thore*, Nep.

A small tree, upper parts of the stem and sometimes the inflorescence and common petioles prickly. *Bark* whitish-grey to greenish brown outside, green underneath the soft corky layer; blaze greenish-white or yellowish, pith large; young parts stellate-tomentose. *Leaves* digitate with usually 5-7 leaflets; common petiole 12-28 in. long. *Leaflets* 4-12 in. by 2-4.5 in., elliptic-oblong, lanceolate or ovate lanceolate, entire or distantly serrulate or crenulate when young, often with scattered stellate hairs above, glabrate with age; main lateral nerves 6-10 on either side, arching, prominent beneath; petiolules up to 2 in. long. *Panicles* large, terminal; bracts oblong or lanceolate; umbels many flowered, racemed on the branches of the panicle, which are up to 12 in. long, terminal umbel largest; lateral umbels on peduncles .5-1 in. long, often aborted; pedicels .5-.7 in. long with a dense cluster of small rusty-stellate hairy, persistent bracteoles at the base. *Flowers* white, small, stellate tomentose. *Disk* flat, obscurely 5-angled. *Fruit* .3-.4 in. across, often somewhat broader than long, subglobose (or didymo-globose—*C. B. Clarke* in *F. B. I.*) crowned by the disk and the persistent style. *Seeds* 1 or 2 with irregularly pitted surface; albumen uniform or nearly so.

Nearly all over the province ascending to 5,000 ft.

Flrs. 2-4. Fr. 12.

A variable species. The flowering forms may be mentioned.

(i) Var. **rufo-stellata** C. B. C. in F. B. I. Vern. *Arti-sam-phru*, Mik.; *Tembri-ching*, Naga; *Mithai-ju-phang*, Cach.—Leaflets with rounded base, denticulate-serrate with scattered rusty stellate hairs above, rusty villose beneath, when young; panicle densely rusty tomentose.

SIBSAGAR, CACHAR, KHASI HILLS.

(ii) Var. **serrata** C. B. C. in F. B. I. Vern. *Adi-tappor*, Miri. leaflets large, elliptic-lanceolate, dentate, serrate; base acute; panicle sparingly woolly—*F. B. I.*

N.-E. FRONTIER. The pith is sometimes used as cork for bottles.

2. **Brassaiopsis aculeata** Seem.

A very variable plant, usually a small tree armed with stout sharp prickles; branchlets thick; young shoots clothed with rusty brown tomentum and bristly hairs mixed. *Leaves* digitately 3-9 foliolate; common petiole 6-18 in. long. *Leaflets* 4-18 by 2-9 in., oblong, lanceolate or oblanceolate, acuminate, cuspidate-serrate or serrulate; base narrowed or acute, usually oblique, usually rounded on the outer half on the outermost pair, thin, glabrous above and thinly covered with pale stellate stiff hairs when mature; lateral nerves 8-14 on either half; petiolules up to 3 in. long. *Umbels* 1.2-1.7 in. across, racemed or solitary by abortion of lateral ones on the branches of a stout panicle. *Flowers* .25-.3 in. across, yellowish green; pedicels .3-.8 in. long, rusty, floccose, tomentose when young, arising from clusters of numerous hairy minute bracteoles. *Fruit* about .2 in. across, subglobose or broadly turbinate.

KHASI HILLS about 4,000 ft.—Wah Nongksep, etc.

Flrs. 1-3. Fr. 5-6.

3. **Brassaiopsis mitis** C. B. Clarke?

A small tree with broad based short prickles; young parts and inflorescence densely covered with bristly hairs. *Bark* greenish grey, green under the corky layers; blaze greenish white, soft. *Leaves* near the tops of branches; 6-18 in. long across, deeply palmately 9-13 fid; segments oblong-lanceolate,

or somewhat narrowly lanceolate, acuminate, serrate, membranous, upper surface membranous, glabrescent when mature, thinly stellate pubescent beneath; petiole 6-18 in. long with persistent weak bristles at the top, otherwise nearly smooth with age; stipules-lower half adnate, upper half free, lanceolate-subulate, about .5 in. long. *Umbels* in large panicles below the bunch of leaves; bracts on the panicle branches .7 in. long, lanceolate, caducous; pedicels up to .7 in. long. *Calyx* when young more or less stellate tomentose. *Petals* glabrous; disk large, subhemispheric. *Fruit* .2 in. across, globose (in Sikkim specimens in Calcutta Herbarium).

Myntang Valley—KHASI HILLS.

There is a single rather incomplete specimen in the Assam Herbarium (Sheet No. 6572); Watt No. 11470 Japvo, Naga Hills!

4. *Brassaiopsis palmata* Kurz.

A small sparingly branched prickly tree; young petiole, undersurface of leaves and inflorescence tomentose with rusty stellate scurf. *Leaves* up to 15 in. across, deeply palmately 7-9 fid, almost (palmatisect in younger plants); segments lanceolate to elliptic lanceolate, central largest, narrowed towards the base, remotely toothed or nearly entire; petiole up to 15 in. long, unarmed; stipules with adnate basal portion and free upper portion which is subulate-lanceolate. *Panicles* large with branches up to 10 in. long; bracts short, concave, acute with a broad base, deciduous; umbels racemed on the panicle branches, upper largest; lateral peduncles .4-1 in. long; pedicels up to .5 in. long; bracteoles numerous, up to .2 in. long, lanceolate, pubescent. *Calyx* rusty tomentose outside, distinctly 5 toothed. *Fruit* crowned by the short style, ellipsoid, or when 2-seeded .5 by .4 in., turbinate, ellipsoid.

Dulong river, LAKHIMPUR.

Eri silk worms are fed on the leaves.

A flowering specimen collected by Mann in Nov. 78. in Khasi Hills at 4,000 ft., (locality not known) is probably this species. The leaf is almost digitately pedate with 7 segments with petiolules up to .7 in. long, joined together by a narrow rib at the apex of the petiole, probably the specimen was collected from a young plant?

Flrs. 3-4.

5. Brassaiopsis Hookeri C. B. Clarke.

A small prickly tree; young shoots, inflorescence, under-surface of leaves and petioles stellate woolly tomentose. *Leaves* digitately 3-5 foliolate; leaflets 4-18 in. long, oblong-lanceolate, acuminate or serrate or nearly entire; main lateral nerves about 8 on either half, deeply sunk above; petiolules .5-1 in. long. *Umbels* .6-1 in. across, in simple panicles; pedicels .25-.3 in. long. *Flowers* .2 in. across. *Calyx* lobes short. *Petals* scruffy-stellate.

KHASI HILLS—Nunklow—about 4,000 ft.,—J. D. Hooker.

There are no specimens from our area in the Calcutta Herbarium.

Brassaiopsis Griffithii C. B. Clarke.

A small tree about 20 ft. high; bark grey brown with short recurved thorns, pith large. *Leaves* palmatifid, 15-24 in. across, 7 lobed, half-way down, pubescent along the nerves, otherwise glabrous, cuspidate-serrate, sometimes doubly so, thinly coriaceous, pubescent along the nerves, otherwise glabrous; lobes ovate acute at the apex; petiole 12-15 in. long, ribbed. *Umbels* 1.2-1.8 in. across, borne on long axillary panicles; pedicels .6-.8 in. long, filiform, subscabrid; buds .2 in. across. *Calyx limb* distinctly toothed; disk conical. *Fruit* globose, .25-.3 in. across, crowned by the calyx teeth and the short remains of the style.

DUFFLA HILLS, Lister! Abor country—Burkill!

Brassaiopsis hispida Seem.

A shrub armed with prickles on the stem petiole and inflorescence; bristles numerous, close, stout and conical more or less deflexed, compressed and conical prickles and bristles mixed, the latter often falling off with age. *Leaves* 10-12 in. across, simple, deeply digitately 7-9 lobed; segments oblong-lanceolate; margins spinose serrate, glabrous above, thinly hispidulous or glabrescent beneath; petioles 8-16 in. long, stipules with two free linear points. *Flowers* about .25 in. across in umbels arranged in large panicles; panicle branches 3-4 in. long; bracts spatulate or lanceolate, tawny tomentose, up to .3 in. long; pedicels .5-.7 in. long, hispidulous. *Calyx* densely tomentose when young; petals about .15 in. long, lanceolate, at first scurfy-tomentose, glabrescent with age. *Fruit* not seen.

MISHMI HILLS. Griffith!

Differs from *B. mitis* by the numerous prickles on the stem, spinose serratures of the leaves and more conspicuous nerves.

Flrs. 3.

9. MACROPANAX Miq.

Small unarmed trees. *Leaves* digitate, 3-5 foliolate. *Leaflets* entire or serrate, glabrous; stipules connate within the petioles or 0. *Flowers* polygamous, pentamerous, umbelled in large panicles; pedicels articulate under the flowers. *Calyx* 5-toothed; petals valvate; stamens 5. *Ovary* 2-celled; styles united, persistent; disk large, often wider than the top of the fruit, broadly conical. *Fruit* striated or ribbed, but not angled. *Seeds* dorsally compressed, albumen rugose or ruminated.

Panicles	rusty tomentose.	..	..	1.	<i>M. oreophilum.</i>
Panicles	glabrous.	..	..	2.	<i>M. undulatum.</i>

1. *Macropanax oreophilum* Miq. Vern. *Pani-kesuri*, Ass.; *La-tong-krong*, Kh.; *Diengiarasi*, Synt.

A small or middle-sized evergreen tree. *Bark* grey, warty and somewhat rough, about .4 in. thick; blaze yellowish, turning brown aromatic; common petiole 5-14 in. long; base dilated and stem clasping; leaflets 3-6 by 1-3 in., lanceolate to elliptic-lanceolate-acuminate, denticulate or serrulate, glabrous or nearly so; main lateral nerves about 5-8 on either side, arcuate; petiolules .25-3 in. long. *Panicles* rusty-stellate tomentose; umbels racemed on the branches, up to .7 in. across, terminal largest, lower smaller, often deciduous; bracts small, narrow-lanceolate, acuminate, caducous, pedicels .1-.2 in. long, elongating in fruit, slender, minutely stellate pubescent; bracteoles few, deciduous; disk large, broadly conical. *Fruit* about .25 in. long, ovoid, crowned by the persistent style.

KHASI HILLS up to 4,000 ft., SIBSAGAR, Barpathar, Naojan, GOALPARA, Borjhar.

Flrs. 9-10. Fr. 2-3.

2. *Macropanax undulatum* Seem. Vern. *Dieng-jurasi*, *Dieng-la-ronsei*, Kh.; *Bon-keseru*, Ass.; *Phumber*, Lush.; *Thing-bo*, Mik.; *Sambrang*, Garo; *Mithaiju*, Cach.; *Thing-rem-te*, Kuki.

A small tree. *Bark* nearly smooth, pale grey, nearly white to greenish grey with large prominent raised lenticels;

blaze cream-coloured or white with pleasant mango-like smell. *Common petiole* 3·5-11 in. long. *Leaflets* 2·5-5 by ·7-2 in., oblong, elliptic or narrow-lanceolate, acuminate, margins entire or with fine distant teeth, glabrous, shining above, membranous; lateral nerves arcuate; petiolules ·3-2 in. long. *Panicle* glabrous, ascending; bracts caducous; pedicels ·1-·2 in. long, elongating in fruit. *Fruit* as in the last species.

Practically all over the province, ascending to 3,000 ft., in the KHASI HILLS.

The gum exuding from wounds is also aromatic.

Flrs. 8-9. Fr. 2.

10. TREVESIA Vis.

Trevesia palmata Vis. Vern. *Dieng-la-kor*, *Dieng-soh-kynthur*, Kh.; *Bhotola*, Ass.; *Chena-thong*, Garo; *Tung-jang-ko*, Kuki; *Khim-thao-ji-phang*, Kach.

Generally an unbranched tree armed with incurved short sharp prickles; young shoots rusty pubescent and very prickly. *Leaves* 12-24 in. across, roughly orbicular in outline, deeply palmatifid or palmatisect in young plants, sometimes digitate; lobes acuminate, serrate or irregularly, often unequally pinnately lobed, glabrous or nearly so, subcoriaceous; common petiole 12-24 in. long, densely prickly at the sheathing base, prickles few, absent upwards; stipules adnate. *Flowers* polygamous, white, ·6 in. across in umbels, which are corymbosely arranged in large deciduously rusty tomentose, terminal panicles; bracts about 1 in. long; pedicels 1·25-1·5 in. long. *Calyx* rusty-pubescent outside; limb free, membranous, undulate or unequally toothed. *Petals* 8-12, fleshy valvate, reflexed or cohering and falling off in a cap. *Stamens* and ovary cells as many as petals, the former erect. *Disk* flat; styles united in a short thick column. *Fruit* fleshy, ·5 in. across, crowned by the persistent style, glabrate; seeds compressed; albumen uniform.

KAMRUP, N. CACHAR HILLS, GARO HILLS, KHASI HILLS, ascending to 2,500 ft.

Flower buds are said to be eaten cooked by the Garos.

Flrs. 2-4. Fr. 5.

11. TUPIDANTHUS Hk. f. & T.

Tupidanthus calyptratus Hk. f. & Th. Vern. *Dieng-la-tyng-kung*, *Ja-lang-kum*, *Dieng-la-tyng-krong*, *Dieng-ja-la-tympoh*, Kh.

A small straggling or ultimately scandent tree, often epiphytic. *Bark* grey or greyish-brown, rough; blaze nearly white to dull-brown; young parts clothed with deciduous brown floccose tomentum. *Leaves* digitately 7-10 foliolate; common petiole 8-18 in. long; stipules connate within the petiole. *Leaflets* 4-9 in. by 1.2-3 in., oblong or oblong-lanceolate, shortly acuminate, narrowed at the base, entire, leathery, shining above; main lateral nerves subparallel, up to about 25, rather indistinct, with many intermediates; petioles .7-2.5 in. long. *Flowers* polygamous (?) in few flowered umbels arranged in panicles, which are often sub-umbellate or corymbose with stout branches; peduncles 1.5-2.7 in. long with leathery persistent concave bracts at the base, about 1 in. long; buds subglobose, .6-.8 in. across; pedicels stout, .5-1.2 in. long. *Calyx-tube* leathery, truncate or nearly so. *Petals* connate, falling off in a cap. *Stamens* many, about 50-70 (F. B. I.); filaments somewhat stout. *Ovary* many celled; stigmas many, sessile, radiating. *Fruit* succulent, 1-1.5 in. across; seeds numerous, thinly compressed, about .2 in. long.

KHASI HILLS, 3-5,000 ft.

Wood yellowish, hard for the family. The growing shoots abound in an aromatic resinous gum.

Flrs. 12-2. Fr. 4.

Fatsia papyrifera Benth. The Chinese rice paper plant. A shrub or small tree. *Leaves* large, up to 19 in. across, palmate, 5-7 lobed, felted with greyish stellate tomentum beneath; petioles long. *Flowers* in paniced umbels.

Cultivated in Shillong.

The Chinese rice paper is manufactured from slices of the pith.

FAM. 69. CORNACEÆ.

Trees or shrubs. *Leaves* extipulate, opposite or alternate, simple, entire or occasionally angled or lobed or serrate. *Flowers* small, regular, bisexual or unisexual, in axillary cymes, panicles or heads. *Calyx-tube* adnate to the ovary; limb persistent, truncate or 4-5 (sometimes many) lobed; lobes valvate or open in bud. *Petals* 4-5, sometimes 0, imbricate or valvate. *Stamens* inserted with the petals at the base of the epigynous disk, and usually equalling them, rarely twice or thrice as many. *Ovary* inferior, 1-4 celled, crowned by a usually fleshy sometimes inconspicuous disk; style simple; stigma capitate or divided; ovule usually solitary, rarely 2, pendulous from the apex of the cell. *Fruit* generally drupaceous with a 1-4 celled stone, less often with 2 pyrenes. *Seed* with copious albumen; cotyledons generally thin, leafy.

Flowers 2 sexual :—

- | | | | | | |
|----------------------|----|----|----|----|-----------|
| Leaves opposite. | .. | .. | .. | 1. | Cornus. |
| Leaves alternate :— | | | | | |
| Petals long, linear. | .. | .. | .. | 2. | Alangium. |
| Petals small, ovate. | .. | .. | .. | 3. | Mastixia. |

Flowers 1-sexual :—

- | | | | | | |
|---|----|----|----|----|------------|
| Trees. Flowers in axillary peduncled heads. | .. | .. | .. | 4. | Nyssa. |
| Shrub. Flowers in umbels borne on the midrib of leaves or large bracts. | .. | .. | .. | 5. | Helwingia. |

1. CORNUS Linn.

Trees or shrubs. *Leaves* opposite, rarely alternate, entire. *Flowers* bisexual, white or yellow in branched usually dichotomous cymes or in involucrate heads. *Calyx-teeth* 4, usually small. *Petals* 4, oblong valvate. *Stamens* 4; anthers oblong. *Ovary* usually 2-celled with a solitary pendulous ovule in each cell; stigma capitate, sub-2-lobed. *Fruit* drupaceous, usually ovoid; endocarp hard, 2-celled, 2-seeded. *Seeds* oblong, compressed; albumen fleshy, cotyledons foliaceous.

Leaves opposite :—

Flowers in compound cymes; drupes free :—

Leaves narrow, oblong or lanceolate, pale green beneath. 1. *C. oblonga*.

Leaves broad-ovate or ovate-elliptic, whitish-grey beneath. 2. *C. macrophylla*.

Flowers in dense globose heads surrounded by large yellow or white petaloid bracts; drupes confluent. 3. *C. capitata*.

Leaves alternate. 4. *C. controversa*.

1. *Cornus oblonga* Wall. Vern. *Dieng-soh-long-law-synrang*, Kh.

A small tree. *Bark* reddish or dark-brown, lenticellate, rather rough outside, light red or cinnamon with pale streaks; young shoots minutely adpressed pubescent. *Leaves* sometimes a few alternate, 1·6 by ·7-1·5 in., oblong or lanceolate-acuminate, subcoriaceous, glabrescent above or minutely adpressed hairy on both side, pale and somewhat glaucous beneath; lateral nerves 3-7 on either half, usually with tumid glands on the axils and sometimes on the axils of the smaller nerves; base narrowed; petioles ·2-·6 in. long. *Cymes* branched, pubescent. *Flowers* pale-yellowish white. ·3 in. across. *Calyx* short, campanulate, slightly hairy. *Petals* about ·2 in. long, oblong, nearly glabrous outside. *Disk* and anthers purple. *Drupe* about ·3 in. long, ovoid, black when ripe, crowned with the remains of the calyx tube and the disk; stone hard.

KHASI HILLS, 4-6,500 ft.

Flrs. 9-12. Fr. 7.

2. *Cornus macrophylla* Wall. Vern. *Dieng-phait*, Khasi.

A medium sized deciduous tree. *Bark* rather rough grey to brown or reddish-brown outside, exfoliating in small polygonal or quadrangular plates in old stems; blaze white or pinkish, soon turning dark brown on exposure. *Leaves* rarely alternate, 8·5-6 by 1·5-4 in., ovate or ovate-elliptic, acuminate, sometimes lanceolate, subacute or sometimes cuneate, often unequal, glabrescent above, lower surface whitish-grey and adpressed pubescent; main lateral nerves

prominent beneath, 5-8 on either half, arcuate, joined by slender sub-parallel tertiaries; base rounded; petiole .5-1.7 in. long. *Flowers* yellowish-white or white in terminal much branched compact pubescent compound cymes arranged on corymbose panicles 2-4 in. across. *Calyx* .1 in. long, urceolate, clothed with white adpressed hairs. *Petals* .2 in. long, strap-shaped, minutely hairy outside. *Disk* prominent, annular. *Drupe* about .2-1 in. long, globose, crowned by the remains of the disk and the calyx tube, black when ripe.

KHASI HILLS, 5-6,000 ft.

Wood light pinkish white, but splits badly in seasoning, wt. 45 lbs. per c. ft.

Flrs. 4-5. Fr. 6-7.

Form a—(Sheet 5868)—A tree attaining 50 ft. *Leaves* alternate, lanceolate to elliptic-lanceolate, acuminate; base very cuneate; petioles up to 3 in. long, often reddish. May prove to be a good variety or subspecies but further examination in the field is necessary before separating it.

3. *Cornus capitata* Wall. Var. khasiana. Vern. Dieng-soh-japhon, Khasi.

A small sized deciduous tree. *Bark* thin brownish grey or almost black, rather rough outside; blaze brown or reddish with deeper coloured streaks; young shoots with short adpressed hairs. *Leaves* approximate at the ends of branches, 2-4 by 1-1.7 in., oblong or elliptic, narrowed at both ends, coriaceous, pale beneath, glabrescent or thinly pubescent with adpressed hairs, specially beneath, nerves 3-5 on either side, arcuate; petiole .5 in. long, channelled with a broad base. *Flowers* .15 in. across, closely packed in globose heads, about .5 in. across, each of which is surrounded by 4 yellowish or white oblong-obovate, petaloid bracts, about 1-1.5 by .6-1 in. *Calyx-teeth* reflexed. *Petals* minute, oblong. *Fruits* coalescing into a red succulent globose head of drupes 1-2 in. across; stones hard, compressed, angular, about .15 in. long.

KHASI & JAINTIA HILLS—not common—5-6,000 ft.

The fruit is edible.

Flrs. 4-6. Fr. 9.

Scarcely separable from the type, which approaches the more hairy forms of our variety very closely.

4. *Cornus controversa* Hemsl. in Kew Bulletin 1909. P. 332.

A small tree; branchlets slender, brown, puberulous, glabrescent. *Leaves* alternate or subopposite, 3-6 by 2-3 in., ovate or elliptic to orbicular-acuminate; base rounded to broadly cuneate, membranous, usually or with few adpressed hairs above when young, glabrescent with age, glaucous beneath, sparsely adpressed pubescent with hairs fixed by the middle; primary nerves on either side, usually 5-8, conspicuous, arcuate; petiole slender, 1-2·7 in. long. *Cymes* compound, terminal, lax, up to 5·2 in. across; branches puberulous. *Flowers* white, about 4·5 in. across. *Calyx-tube* pilose with silvery hairs. *Petals* narrowly oblong, subobtus. *Stamens* slightly exceeding the petals. *Style* cylindric, glabrous. *Drupe* globose, 25-3 in. across, glabrescent, thinly adpressed-pubescent, apex excavate; stone 2-celled, longitudinally furrowed.

KHASI HILLS, 4-5,000 ft. MANIPUR extending to SIKKIM.

Closely allied to *C. macrophylla* from which it differs mainly by its alternate leaves. It may be regarded as the eastern form of the latter—never having been collected hitherto west of Sikkim.

Flrs. 4-5. Fruit 7.

2. ALANGIUM Lamk.

Trees or shrubs, sometimes spinous. *Leaves* alternate, entire or lobed, often unequal at the base. *Flowers* 2-sexual, in axillary cymes or fascicles; pedicels jointed. *Calyx-limb* 5-10 toothed or truncate. *Petals* 5-10. *Stamens* as many as the petals or twice or three times as many; filaments hairy at the base; anthers very long. *Ovary* inferior, 1-2 celled; stigma capitate. *Fruit* baccate, crowned by the calyx tube. *Seed* oblong.

Ovary 2-celled; ovules 1 in each cell.	.. 1.	<i>A. begoniæfolia</i> .
Ovary 1-celled; ovules 2 in each cell.	.. 2.	<i>A. barbata</i> .

1. *Alangium begoniæfolia* Roxb. Syn. *Marlea begoniæfolia* Roxb. Vern. *Dieng-mylliat-lap*, *Dieng-sla-doh*.

Synt.; *Dieng-sla-umpai*, *Dieng-sikhor-khla*, *Dieng-iang-sat-bieit*, *Dieng-sohkympe*, Khasi; *Phagrang*, Garo; *Chika-maruli*, *Chagali-gach*, *Bogamarulia*, *Bodi-dhili*, *Kodal-kania*, *Chorai-hara*, *Bangalmani*, *Chika-amrulia*, Ass.; *Marli*, Sylh.; *Taktong*, *Taktar-ragrang-asing*, Miri; *Rompab-arong*, *Thengjoy-arong*, Mik.; *Musa-mogon*, Mech.; *Bon-khan-khlu*, *Chersem-phang*, Kach.; *Thing-moi-te*, Kuki; *Sangkong-changne*, Duff.

A small rather straggling tree with grey or brown nearly smooth often warty bark; blaze white with green edges; young parts grey or brown silky, glabrous with age. *Leaves* simple, alternate, bifarious, 3-10 in. long, very variable in width, ovate-acuminate to suborbicular or broadly subquadrate, entire, angled or lobed; lobes often acuminate, glabrous above when mature, undersurface more or less pubescent along the nerves and with tufts of hair on the nerve axils, thin but tough; basal nerves 4-8; lateral nerves excluding the basal up to 4 on either half, all joined by intramarginal loops and by subparallel somewhat distant tertiaries; base usually oblique, truncate, cuneate or deeply cordate; petiole 1-1.5 in. long, grooved on the inner side, glabrescent or pubescent. *Flowers* white or cream coloured, .6-.9 in. long, bracteate, in axillary dichotomous usually compound and pedunculate cymes not exceeding the leaves; bracts linear; pedicels up to .2 in. long, pubescent, jointed towards the top. *Calyx* minutely toothed, covered with long scattered hairs. *Petals* 6-8, strap-shaped, puberulous. *Stamens* as many as and alternating with the petals; filaments short, covered with long silky hairs; anthers about .3 in. long and much exceeding the filaments; disk hemispheric. *Ovary* 2-celled; style up to .5 in. long. *Drupe* ovoid, dark purple when ripe, obscurely ribbed, about .3-.5 in. long, crowned by the calyx limb; stone 2-celled, 2-seeded.

Throughout the area ascending to about 4,000 ft. in the KHASI HILLS.

Flrs. 3-6. Fr. 6-9.

2. *Alangium barbata* R. Br. Vern. *Sal-biholom*, Syl.

A straggly small tree or large shrub with greyish-brown smooth bark; young parts, inflorescence and petiole shaggy

with spreading golden hairs which turn brownish with age. *Leaves* 5-9 by 3-4-5 in., obliquely ovate, acuminate, about 5-6 nerved, sometimes angled or obscurely lobulate, entire, membranous, thinly pubescent with rather long brownish hairs above, more densely beneath specially along the nerves; lateral nerves 5-7 on either half, nearly straight, more or less looping near the margin, joined by sub-parallel tertiaries; base subcordate; petioles .9-1.5 in. long. *Cymes* shorter than the leaves, dichotomous; bracts linear. *Calyx* small, shaggy with spreading golden hairs; teeth minute, lanceolate. *Petals* 5 or 6, linear oblong, hairy outside, .3-.5 in. long. *Filaments* short, hairy. *Disk* prominent, rather elongate, with as many grooves (at least in dry specimens) as stamens; style glabrous; stigma subclavate, 2-fid. *Drupe* .3-.4 by .2-.25 in., ovoid, thinly pubescent or glabrescent, slightly striated.

SYLHET, CACHAR—Prazer, Deimara—A. C. Chatterji.

Flrs. and Fr. 12-5—most of the year?

Alangium Lamarckii Thwaites. Vern. *Akola*, Hind. A deciduous shrub or small tree; bark pale-brown. *Leaves* 2-5-6 by .7-2 in., alternate, simple, narrow oblong, entire. *Flowers* fascicled. *Calyx-lobes* 6-10, triangular, minute. *Corolla* woolly outside; petals 5-10, reflexed, linear. *Stamens* up to 30; filaments plumose at the base. *Ovary* 1-celled. *Drupe* .5-.75 in. long, globose or ellipsoidal.

Dhodar Ali (Sibsagar). Introduced from Bihar.

Flrs. 3-4. Fr. 5-8.

3. MASTIXIA Blume.

Mastixia arborea C. B. Clarke. Vern. *Bolong-jigri*, Garo.

A large tree. Bark brown or dark-brown with horizontal wrinkles, about .5 in. thick, tan brown, fibrous inside. *Leaves* alternate or opposite, 3-8 by 1-5-3-5 in., obovate-oblong or elliptic, bluntly, usually abruptly-acuminate, entire, narrowed at the base, glabrous, pale beneath; main lateral nerves 5-8 on either half, arched; nervules delicately reticulated between; petiole .5-1.5 in. long, minutely pubescent when young. *Flowers* green, 2-sexual, .25 in. across, in terminal pubescent panicles of cymes; bracts

about .15 in. long, triangular, acute; pedicels very short or 0, jointed below each flower, 2 bracteolate. *Calyx* campanulate, adpressed pubescent outside, .15 in. long; teeth 5, short, triangular, acute or lanceolate. *Petals* 5, valvate in bud, .1-.15 in. long, ovate acute, leathery, adpressed silky on both faces, more densely outside, with shallow ridge in the middle inside. *Stamens* 5, alternating with the petals. *Disk* fleshy, yellow, with several up to about 10 radiating grooves at the top. *Ovary* inferior, 1-celled, with a solitary ovule, pendulous from the wall of the ovary near its summit; style short, with a somewhat dilated base, obscurely ribbed. *Drupe* purplish-green, ovoid-ellipsoid, about 1-1.2 in. long; endocarp intruded laterally on one side. *Seed* ellipsoid.

LAKHIMPUR, GARO HILLS.

Flrs. 3-4.

Mastixia rostrata Bl. A shrub or a small tree. *Leaves* 2.5-5 by 1-3 in., subopposite or alternate, lanceolate or oblong, acute or acuminate, glabrous; lateral nerves 6-7 on either half, conspicuous underneath; midrib depressed above, prominent beneath; petiole .4-.6 in. long. *Corymbs* somewhat branched, lax, few flowered. *Stamens* 3. *Fruits* about 2 in. long, elongate-ovoid.

AKA HILLS (15160).

Aucuba himalaica Hk. f. A large stout shrub or small tree, evergreen; young parts hairy. *Leaves* opposite, 4-8 by 1.2-2 in., lanceolate, long, acuminate, distantly serrate or denticulate; petiole .6-1 in. long. *Flowers* purplish, diœcious, in axillary hairy paniced fascicles. *Calyx* 4-toothed. *Petals* lanceolate, valvate. *Stamens* 4; disk fleshy, quadrangular. *Calyx-tube* ovoid. *Ovary* 1-celled; stigma capitate; style short. *Berry* ellipsoid, crowned with the calyx, scarlet or orange, .5 in. long (Brandis).

AKA HILLS (15159), MANIPUR, BHUTAN (5,900 ft.).

4. NYSSA Linn.

Nyssa sessiliflora Hk.f. Vern. *Gaharichopa*, Ass.

A large tree; young parts silky pubescent. *Bark* grey or brown, rather rough and warty with lenticels, about 1 in. thick; blaze light brown, mottled with darker brown, turning dirty brown on exposure. *Leaves* alternate, collected at the ends of the branches, 4-9.5 by 1.5-3 in., elliptic to

elliptic-ovate or oblong to elliptic lanceolate, acute or acuminate, narrowed or cuneate at the base, entire, membranous, closely punctate on both surfaces, glabrescent above, glaucous and thinly pubescent specially along the midrib and the nerves beneath; lateral nerves 13-17 on either half; petiole 1-1.5 in. long. *Flowers* green, unisexual, sessile, collected together in many bracteolate dense globose pedunculate heads; peduncles 1-2 in. long, axillary, *Male heads*: *Peduncles* sometimes bearing few flowered clusters below the head, less often branched. *Calyx-tube* solid, pedicel-like, about .2 in. long, pubescent. *Calyx-teeth* 5, rarely 6-7, short, subacute or rounded, ciliate. *Petals* as many as calyx lobes, imbricate in bud, elliptic or elliptic-oblong, silky pubescent outside, except on the margins. *Stamens* 10, alternately long and short. *Disk* fleshy, grooved, opposite the insertion of the stamens. *Female heads* on stouter and shorter peduncles than those of the male heads. *Calyx* campanulate, about .1 in. long; limb 5 toothed, deciduous. *Petals* 0; staminodes 0. *Ovary* 1-celled; ovule solitary, pendulous; style cylindric, short. *Berry* ovoid, glabrous; apex pointed, about .5 by .3 in.; seed with copious albumen.

LAKHIMPUR, SIBSAGAR, N. CACHAR HILLS, SYLHET, KHASI HILLS up to 3,000 ft.

The timber is yellowish, fine grained and takes a good polish, weighing about 39 lbs. per c. ft. It is an important building timber in the Districts where it grows. Commercially it is known as "gohorisopa"—a name which really applied to *Magnolia Griffithii*—probably from a superficial resemblance of the timber to those of "sopas" with which it is often substituted.

The tree coppices well.

Flrs. 4. Fr. 5. Nearly deciduous but never quite leafless.

C. B. Clarke in F. B. I and Brandis state that the heads have few female flowers and many male flowers. All the sheets in the Assam herbarium have unisexual flowers.

N. B.—*Nyssa javanica* Wenger also occurs in the area of the Flora.—R. N. De.

5. HELWINGIA Willd.

Helwingia himalaica Hk. f. & T.

A small glabrous usually epiphytic shrub. *Leaves* alternate, 2-6 by .7-1.5 in., lanceolate, long acuminate,

cuspidate-serrate, membranous; lateral nerves about 6 on either half, much arched; petiole .5-1.5 in. long, slender. *Flowers* minute, 1-sexual, in sessile umbels borne on the midrib of leaves about $\frac{2}{3}$ rd of its length from the base or on the midrib of spatulate-oblong sessile bracts; pedicels slender, about .1 in. long. *Male umbels* with more numerous flowers. *Calyx* truncate. *Petals* and stamens 3-5. *Ovary* 3-4 celled; style combined at the base. *Fruit* sessile or nearly 1-3 together on the same leaf, .25-.3 in. long, red when ripe, 2-3 celled with furrows between the carpels. *Seeds* rugose, compressed; embryo minute in copious albumen.

KHASI HILLS—Mawphlang, C. B. Clarke! Shillong, C. B. Clarke.

Flrs. 4-5. Fr. 6-9.

Helwingia lanceolata Watt. Mss. in Herb. Cal. is hardly a different species. It is a smaller shrub with narrower leaves and fewer flowered umbels.

MANIPUR, NAGA HILLS.

ADDENDA.

Since the drafting of the original manuscript of this Volume, about eight years ago, a considerable number of literature has been published which contains description of new species and new records. It would have been very desirable to include and record all of them here, but as the printing of the present work was in progress, it has not been practicable to do so.

Desmodium rufihirsutum Craib. Vern. *Machrukimei*, Garo. (Leguminosæ-Papilionatæ).

An erect under-shrub. *Leaves* 6-12 in. by 3-8 in., ovate elliptic or elliptic, entire, ciliate, acuminate, rigidly chartaceous; lateral nerves 5-7 on either half; base rotundate, stipules subulate. *Racemes* dense flowered; peduncle short; flowers blue (Mr. N. E. Parry). *Calyx-tube* .05 in. long. *Vexillum* obovate, .3 in. long; *alæ* .12 in. long; *carina* .2 in. long; *ovary* .16 in. adpressed, pubescent; *style* .1 in. long.

GARO HILLS (Baghmara 500 ft.) MANIPUR.

Flrs. 11.

(Kew Bulletin 1936, p. 280).

Desmodium oblongum Wall (*Vide* page 61 of this Volume).

Also NAGA HILLS (3,000 ft.) S. LUSHAI HILLS (5,6,000 ft.).

Flrs. & Fr. 8-12.

(Kew Bulletin 1932, p. 198).

Potentilla microphylla Don. (Rosaceæ.)

A densely tufted dwarfish under-shrub with perennial woody root-stock, very variable in habit. *Leaflets* numerous,

small, oblong or rounded; petiole slender; stipule membranous. *Stamens* 30-40. *Achenes* in globose heads.

DELAIR VALLEY (4000 ft.).

Flrs. & Fr. 6-9.

(Kew Bulletin 1932, p. 348., F. B. I. p. 352).

Potentilla monanthes Lindl. Var. *sibthorthoides* Hk. f.

"A flat rosette plant on Alpine slopes"—stem filiform, prostrate. *Leaves* radical, .06-.25 in. broad. *Flowers* .25 in. across, axillary and sub-terminal; pedicels short; bracteoles narrow. *Calyx* pubescent, narrow. *Petals* bright-yellow. *Achenes* minute, numerous; receptacles globose, villous.

DELAIR VALLEY (13,000 ft.).

Flrs. & Fr. 7-9.

(Kew Bulletin 1932, p. 348., F. B. I. p. 358).

Sorbus foliolosa Spach. (Rosaceæ.)

A shrub 6 in. tall. *Leaflets* 7-11, 6.2 by 1.56 in. narrow, oblanceolate, long acuminate, entire, coriaceous, glabrous; lateral nerves 7-9, conspicuous; nervules obscure; base narrow, cuneate; petiolule .4 in. *Panicles* 8.2 in. long; flowers pentamerous. *Ovary* 5 locular.

Flrs. 9.

The following species of this genus are also recorded from Assam.

Sorbus Expansa Kœhne.

A shrub or small tree.

DELAIR VALLEY (6000 ft.).

(Kew Bulletin 1932, p. 348).

Sorbus Wenzigiana Kœhne.

Flowers reddish crimson.

DELAIR VALLEY (12-13,000 ft.).

Flrs. 6.

(Kew Bulletin 1932, p. 348).

Photinia Wardii C. E. C. Fischer. (Rosaceæ).

A large climber; branchlets purplish brown. *Leaves* 3·9 by 1·5-3·5 in., elliptic, acute, cuspidate, entire, coriaceous, almost glabrous; midrib impressed above, prominent below; lateral nerves 10-14 on either half; petiole 1·2 in. long, flocculant-tomentose when young; stipules caudate-lanceolate, early deciduous, tomentose. *Inflorescence* brachiate; corymbs somewhat flat-copped; flowers cream, very fragrant. *Calyx* glabrous, ·1 in. long; tube funnel-shaped; segments 5, ovate, obtuse. *Petals* 5, oblong or sub-orbicular, obtuse, ·2 in. long, glabrous. *Stamens* about 20, glabrous, slightly bigger than the petals. *Ovary* densely villous, 2-celled; style 2, free, glabrous. *Fruit* not seen.

Flrs. 4.

(Kew Bulletin 1936, p. 281).

Saxifraga brachypoda Don. (Saxifragaceæ).

A small herb. *Stem* simple. *Leaves* about ·5 in. long, linear-lanceolate, half amplexicaul. *Flowers* solitary, terminal. *Calyx-segments* ovate, acute. *Petals* golden yellow, much exceeding the calyx.

DELAIR VALLEY (12,13,000 ft.).

Flrs. & Fr. 7-10.

(Kew Bulletin 1934, p. 91).

Saxifraga diversifolia Wall.

Herb, root-stock perennial, "stem leaves and inflorescence covered with crimson glandular hairs". *Radical leaves* large, ovate, sub-cordate, long petioled; cauline ·8 in, ovate or broadly oblong. *Inflorescence* corymbose; flowers "bright yellow, closely spotted with ochre" (K. Ward). *Calyx* segments ovate, oblong, reflexed. *Petals* with 4-stalked glands at the base, much larger than the calyx segments. *Capsule* ovate-oblong; seeds angular; testa somewhat plaited.

DELAIR VALLEY (11,12,000 ft.).

Flrs. 8-10. Fr. Cold season.

(Kew Bulletin 1934, p. 91).

Saxifraga hispidula Don. Var. *Doniana* Engl.

A small herb in clumps; root-stock perennial and often woody; stem hispid. *Leaves* .3-.5 by .1 in., ovate-oblong, acute. *Flowers* bright-yellow. *Style* short. *Seed* sub-trigonus.

DELAI VALLEY (11,-12,000 ft.).

Flrs. 7-10.

(Kew Bulletin 1934, p. 91).

The following species is also recorded from the region of the "Flora".

Saxifraga sarmentosa Linn.

DELAI VALLEY (6,-7,000) ft.).

Flrs. 4.

(Kew Bulletin 1934, p. 91).

Pottingeria acuminata Prain. (Saxifraceæ).

A small shrub. *Leaves* ovate-lanceolate, rigidly coriaceous, glabrous 5-nerved at the base. *Flowers* in lateral cymes; capsule septicidally 3-valved; the 3 placentæ remain attached to the style when the capsule opens. (Brandis p. 299).

NAGA HILLS.

Flrs. 3.

(Kew Bulletin 1937, p. 474).

Sonerila khasiana C. B. Clarke. (Melastomaceæ).

Small herb with fibrous roots. *Stem* puberulous. *Leaves* fascicled at the apex, .7 by .2 in. ovate, ciliate, more or less crenate-serrate, usually acute with scattered bristly hairs above, rather more hairy beneath specially on the nerves; palmately 5-nerved with 2 more nerves arising a little higher and curving into the apex; base cordate; petiole .6-2.2 in. long, slender. *Inflorescence* terminal; flowers 1-7 in an umbel; bracteoles minute, linear-ensiform. *Calyx* .2 in. long, narrowed, turbinate, more or less trigonus. *Petals* mauve, broadly ovate, acute. *Stamens* equalling the petals;

filaments slender; anthers yellow. *Capsule* narrowly oblong, .3 in. long. *Seeds* minute, rather finely papillose, oblong.

KHASI & JAINTIA HILLS (3,500 ft. Mamloo, Jaraïn).

LUSHAI HILLS (4,000 ft.).

Flrs. 9. Fr. 9-11.

(Kew Bulletin 1932, p. 199).

***Sonerila tenera* Royle.**

Stem weak. *Leaves* .25-.5 in. long, ovate, nearly entire, laxly hairy; petiole about .1 in. *Flowers* pale-pink. *Calyx* puberulous; teeth ovate, acute. *Petals* .1 in. long, rose-purple. *Capsule* trigonous, funnel-shaped, .25 in. long; seeds ovoid, smooth.

LUSHAI HILLS (3,400 ft.).

Flrs. 11.

(Kew Bulletin 1932, p. 199., F. B. I. p. 530).

***Sonerila villosa* C. E. C. Fischer.**

Small herb with creeping rhizome. *Stem* more or less white-villous. *Leaves* crowded at the apex of the stem, 1.4 by .8 in., broadly ovate to orbicular, rounded or narrowed and obtuse or sub-acute, minutely crenate-serrate; upper surface with scattered crisped hairs from bulbous bases; lower more softly hairy, more densely so on the nerves; palmately 5-nerved; base shallow-cordate; petiole 1.5 in. long, slender, more or less white-villous. *Inflorescence* terminal; flowers solitary or 2-3; bracts 1-3, minute. *Calyx* .16 in. long, narrowly turbinate, white, villous; teeth small, triangular, acute. *Petals* more or less elliptic, .25 in. long. *Stamens* slightly exceeding the petals; anthers alternate, deep yellow. *Capsule* .25 in. long, smooth, truncate campanulate.

LUSHAI HILLS (2,500-4,000 ft.).

Flrs. & Fr. 7-8.

(Kew Bulletin 1932, p. 200).

***Begonia Wengeri* C. E. C. Fischer. (Begoniaceæ).**

Herb with small fibrous root stock. *Leaves* .7-2.2 in. in diameter, rotund-ovate, inequilateral, acute, simply or doubly

crenate with cilia between the crenatures and sometimes at their apices, dark green and sparsely hairy above, pale below; 7-8 nerved; base shallow-cordate; petiole slender, 2 in. long, hairy; stipule ensiform, acuminate. *Female-flowers* perianth segments 4, white; outer broadly ovate-obtuse; inner smaller, sub-acute. *Stamens* about 12, twisted below. *Male-flowers* perianth segments 5, white. *Ovary* trigonous .16 in. long; styles 4, shortly united at the base; stigma densely fuscous-hairy. *Capsule* 3-winged, .4 in. long; seeds brown, minute, oblong-ellipsoid.

LUSHAI HILLS (1,500-2,000 ft.).

Flrs. & Fr. 8.

(Kew Bulletin 1932, p. 200).

The following species are also recorded from Assam; but for want of specimens and literature could not be fully described.

Uraria hispida Schindl. (Leguminosæ-Papilionateæ).

A shrub. *Flowers* pink.

NAGA HILLS (Themokedema, 4,500 ft.) (N. L. Bor, 6173).

Flrs. 9.

(Kew Bulletin 1937, p. 474).

Pueraria Yunnanensis Franch. (Leguminosæ-Papilionateæ).

A climber in thickets and clearing along the edge of the jungle. *Flowers* white, tipped with violet.

LOHIT VALLEY (3,500 ft.).

Flrs. 10.

(Kew Bulletin 1932, p. 198).

Rubus pectinarius Focke. (Rosaceæ).

A creeping plant with erect flowering shoots forming a loose carpet on open slopes.

DELAH VALLEY (10,11,000 ft.).

Flrs. 8.

(Kew Bulletin 1932, p. 348).

Deutzia purpurascens (Hk. f. & T.) Engl. (Saxi-fragaceæ).

A long branched bushy shrub. *Flowers* pale-pink.

DELAI VALLEY (9,-10,000 ft.).

Flrs. 6.

(Kew Bulletin 1934, p. 90).

Oxyspora serrata Diels. (Melastomaceæ).

A shrub. *Flowers* mauve.

NAGA HILLS (6,000 ft.).

Flrs. 7.

(Kew Bulletin 1937, p. 474).

Sanicula hacquetoides Franch. (Umbelliferæ).

Flowers white and mauve.

Abundant in Alpine Region. **Delai Valley** (11,-13,000 ft.).

(Kew Bulletin p. 91).

Schefflera shweliensis W. W. Smith. (Araliaceæ).

Medium-sized or small much branched tree having the appearance of a clump of palms.

NAGA HILLS, MANIPUR, **DELAI VALLEY**.

(Kew Bulletin 1934, p. 91).

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VERNACULAR, SANSKRIT AND ENGLISH NAMES

(*Ass.* means Assamese; *Beng.* Bengali; *Cach.* Cachar or Cachari; *Duff.* Daffla; *Kach.* Kachari; *Kh.* Khasi; *Lush.* Lushai; *Manip.* Manipur; *Mik.* Mikir; *Nep.* Nepali; *Sans.* Sanskrit; *Syl.* or *Sylh.* Sylhet; *Synt.* Synteng; *Tipp.* Tippera; *Eng.* English).

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FLORA OF ASSAM

•
BY

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VOL. III.

CAPRIFOLIACEÆ TO PLANTAGINACEÆ



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FOREWORD.

It is with much pleasure that Volume III of the Flora of Assam is published. This brings us to the end of Gamopetalæ. Steps will be taken to get Volume IV published from the beginning of the next Financial year.

The late Rai Bahadur U. N. Kanjilal made a comprehensive collection of materials for this Volume, but many Forest Officers and others have also made material-contribution by sending specimens.

The draft has been revised and edited by Mr. A. Das, I.F.S., now retired, and I as Botanical Officer alone had to go through the proofs and make some additions and alterations. My Botanical Assistant, Babu Banka Bihari Syam, has been of great help to me in correcting the proofs and in other ways and I gladly acknowledge his services. The Volume has run up to over 500 pages, much beyond anticipation, but no pains have been spared to avoid mistakes.

Shillong,
The 15th February, 1939.

R. N. De, I.F.S.
Botanical Forest Officer.

PREFACE

The third Volume of the "Flora of Assam" (Gamo-petalæ) is now put before the public. The original manuscript of this Volume was completed by me, before my retirement in December 1934. (Ericaceæ—P. C. Kanjilal).

I had to take up this work again by the end of 1937, thoroughly revising and editing my original draft which extended over a period of more than 12 months and involved several references to Kew, Edinburgh, Sibpur and DehraDun and necessitated many personal visits to the herbarium of the Royal Botanic Garden, Calcutta, at my own cost, as in the prolonged period intervening between the original draft and the present publication, considerable changes in nomenclature have taken place, new species have been discovered and described and species have been newly recorded from the region of this "Flora".

I have since described several species (previously not included) which have in certain cases been embodied in small type in this work or included in the addenda with short descriptions. In some instances the original Key to the species or even to the genus had to be revised and altered. Considerable alterations in nomenclature had to be resorted to in view of recent advancement.

It is not realised by critics that the compilation of the "Flora of Assam" could not be comprehensive as the orders of the Government of Assam on the subject were quite distinct. The original idea was therefore to prepare a "Forest Flora" for the region administered by the Forest Department and generally to exclude the herbs unless of great economic importance. I have tried to include on my own initiative whatever additional materials I have been able to obtain in India by personal visit to Sibpur herbarium or by correspondence with DehraDun, Kew and Edinburgh.

An attempt has however been made to bring this Volume, as far as practicable up-to-date, but in the absence of

facilities for ready reference, it is impossible to do justice to a work of this nature. Omission in including a few species of trees, shrubs and many herbs could not however be avoided.

It now remains to acknowledge thanks and indebtedness to all those who have rendered assistance in various ways in the compilation of this Volume.

(1) Prof. Sir W. W. Smith, Regius Keeper, Royal Botanic Garden, Edinburgh.

(2) Mr. C. E. C. Fischer, Royal Botanic Gardens, Kew.

(3) Director, Royal Botanic Gardens, Kew.

(4) Superintendent, Royal Botanic Garden, Sibpur.

(5) Forest Botanist, Forest Research Institute, Dehra-Dun.

(6) Mr. M. V. Narayanswami, Royal Botanic Garden, Sibpur.

(7) Mr. D. Chatterjee, M.Sc., Royal Botanic Garden, Edinburgh.

I am personally indebted to Mr. R. N. De, B.Sc., I.F.S., for his hearty co-operation in all matters and to my friend Dr. K. P. Biswas, M.A., D.Sc., F.R.S.E., Superintendent, Royal Botanic Garden, Sibpur, for his ungrudging help in all possible directions and also to Babu Banka Bihari Syam, Botanical Assistant, Forest Botanist's Office, Shillong, who is associated with this work from its very inception.

In spite of repeated proof-reading it has not been practicable to avoid printer's mistakes.

A. DAS.

Shillong,
The 21st February, 1939.

INTRODUCTION.

In this Volume 36 families 345 genera and about 1,100 species and the following new species have been included (*vide* the Assam Forest Records Volume I, 1934, and Notes Royal Botanic Garden, Edinburgh. No. XCV, July 1938).

Agapetes Kanjilali Das.

Maba cacharensis Das et. Kanjilal.

Chirita mishmiensis Debbarman ex Biswas.

Strobilanthes furcatus Biswas.

Acrocephalus verbenæfolius Watt Mss. descript. Mukherjee.

Scutellaria assamica Mukerjee.

It has been exceedingly difficult for me to keep in touch with the modern nomenclature. Mr. Fischer of Royal Botanic Gardens, Kew, Dr. K. P. Biswas and Mr. Narayanswami of Royal Botanic Garden, Sibpur and Mr. D. Chatterjee, M.Sc., now working at the Royal Botanic Garden, Edinburgh, have rendered invaluable assistance in this connection. As far as practicable, the changes in modern nomenclature have been adopted. In some instances the modern name has been inserted after the old name as otherwise it would have necessitated the alteration of a large bulk of the manuscript and in consequence delayed this publication considerably.

It is my intention to discuss concisely the modern adoption in nomenclature in the following pages.

Cephalanthus occidentalis Linn has been introduced in this Volume as synonymous with *C. naucleoides DC* after Brandis, but there is a good deal of controversy on this. Craib (*Flora Siamensis Enumeration* Volume II, 1932, p. 8) considers it rather unnatural to make the East Asiatic *C. naucleoides DC* synonymous with the North American *C. occidentalis Linn*.

The genus *Wendlandia* has been thoroughly revised by Dr. Cowan (*Notes Royal Botanic Garden, Edinburgh, No. LXXX, October, 1932*) it has not been quite practicable to

take advantage of this publication. I have generally followed Brandis and put a concise note on the additional species after Dr. Cowan.

A good deal of difference of opinion exists among botanists at present about the synonymy of the genera *Hedyotis* and *Oldenlandia*. It is considered best to retain the name *Oldenlandia* following the views of a number of systematist. This change could not be made in time in the body of this Volume.

The generic name *Mycetia* Reinw (1826) has been retained for *Adenosacme* Wall (1832) for the sake of priority.

The genera *Webera* Schreb, *Tarenna* Gærtn and *Chomelia* Linn, are synonymous. There is a suggestion from Kew that the generic name *Tarenna* should be substituted for *Webera*.

Mr. D. Chatterjee, Edinburgh, suggests that the name *Chomelia* (Linn) should be retained from the point of view of priority.

- (i) *Chomelia* Linn (1737) (non-*Chomelia* Jacq (1763).
- (ii) *Webera* (Schreb) (1791) = *Chomelia* Linn.
- (iii) *Tarenna* Gærtn (1788) = *Chomelia* Linn.

Gamble in *Flora of Madras* has changed to *Chomelia* and Craib has retained *Tarenna* in "*Flora Siamensis*."

It appears that the *new combinations* of the species of *Webera* recorded from Assam have not yet been made, the generic name *Webera* and the old specific names have therefore been retained in this Volume.

Crabi dendron W. W. Smith (Record of Botanical Survey of India, Vol. IV, 1911, p. 276). *C. Mannii* Smith and *C. Henryi* Smith were described in Notes Royal Botanic Garden, Edinburgh, 1912, pp. 158 & 159 from Jowai and Yunnan respectively on very imperfect materials. Dr. Bor's Naga Hills specimens (Nos. 6271 and 2828) has now definitely proved that they are the same plant and the name *C. Henryi* Smith should be retained.

Mr. Chatterjee, Royal Botanic Garden, Edinburgh, has made new combinations as given below for *Sideroxylon* which name however has been retained in this work.

Sideroxylon Hookeri *Clarke*=*Planchonella Hookeri* (*Clarke*)

S. grandifolium Wall=*P. grandifolia* (Wall) Chatterjee Comb. Nov. Mss.

S. assamicum Clarke=*P. assamica* (Clarke) Chatterjee Comb. Nov. Mss.

Parameria pedunculosa Benth should now be named *P. glandulifera Benth.* Mez in *Pflanzenreich* calls *Embelia Nagushia Don*, *E. undulata* as he identifies *E. Nagushia Don* with *E. vestita Roxb.* In this work Brandis has been followed.

A considerable discussion has been raised in *Bot. Mag.* (8976) and the name *Wattakaka volubilis* (*Linn*) *Stapf.* has been restored as a new combination by *Stapf.* for *Dregea volubilis Linn.*

Crawfordia (*Gentianaceæ*) has been included under *Gentiana* by Marquand. *Limnantheum cristatum Griseb* is now known as *Nymphoides cristata (Griseb) O. Ktze.*

The generic name *Trichospermum* Don has been introduced by Dr. O. Kuntze for *Æschynanthus Jack* (Revision of *Gen. Plant.* pt. II, p. 475). After necessary investigation the conclusion arrived at is that the name *Æschynanthus Jack* is very well established, valid and universally accepted and should therefore be retained.

[*Vide* (a) D. C., *Monograph Phanerogam.* V (1883), 18, (b) Hooker, *F. B. I.*, Vol. IV. (1884) 377, (c) Ridley, *Flora of Malay Peninsula*, Vol. II (1923), 496 (d) Handel Mazete, *Symbolæ sinicae*, Vol. II (1936) 884, (e) Smith, *Record Bot. Survey of India* (1913) 404, (f) Anthony Notes, Royal Botanic Garden, Edin. (1934) 191. 192. (g) Fischer, *Kew Bulletin* (1934) 320, 321.]

The name *Haplophragma P. Dop.* has been introduced for the genus *Heterophragma DC.* as the correct name.

Dædalacanthus Anders has been changed to *Eranthemum Linn.* and *Eranthemum Linn.* of C. B. Clarke (*F.B.I.*) is now known as *Pseuderanthemum Radlkf.* Genus *Ebermaiera Nees* has been changed to *Staurogyne Wall* and *Asystasia* to *Mackaya.*

The following species has appeared in the body in their old nomenclature which could not be corrected in time.

MODERN NAME	NAME USED IN THIS VOLUME
<i>Premna corymbosa</i> (Burm. f.) <i>Rottl. et Willd.</i>	<i>Premna longifolia</i> Roxb.
<i>Clerodendron indicum</i> (Linn.) <i>O. Ktze.</i>	<i>C. Siphonanthus</i> Br.
<i>C. glandulosa</i> Colebr ex Wall.	<i>C. Colebrookiana</i> Wall.
<i>Sphenodesma involucrata</i> (Presl.) <i>Robinson.</i>	<i>S. unguiculata</i> Schau.

Numerous specific names have undergone changes also.

Herbs, which have been collected in this herbarium, have been generally described and included in this Volume.

Shillong,
The 22nd February, 1939.

A. Das.

FLORA OF ASSAM

GAMOPETALÆ.

FAM. 70. CAPRIFOLIACEÆ.

Shrubs or small trees erect or scandent, rarely herbs, often with broad pith. *Leaves* opposite, rarely alternate, simple, lobed or imparipinnate; stipules usually absent. *Flowers* hermaphrodite, actinomorphic or zygomorphic, in cymes or panicles. *Calyx-tube* adnate to the ovary; limb usually 5-fid, imbricate. *Corolla* epigynous, funnel-shaped, tubular or rotate; lobes usually 5, imbricate, sometimes bi-labiate. *Stamens* usually 5, epipetalous, alternating with the lobes; filaments filiform or subulate; anthers 2-celled, versatile, dehiscing longitudinally. *Ovary* inferior, 2-8 celled (rarely 1); style terminal, elongating; stigma usually capitate; ovules anatropous, 1-8, pendulous from the inner angle or axile. *Fruit* a drupe with 1-8 cartilaginous pyrene or a many seeded berry, rarely capsular or dry. *Seeds* with copious fleshy albumen; embryo minute.

I. Corolla actinomorphic :—

Fruit 1 seeded :—

Leaves pinnate. 1. **Sambucus.**

Leaves simple, usually toothed. 2. **Viburnum.**

II. Corolla zygomorphic :—

Fruit many seeded :—

Stem solid. Ovary 2-3 celled. 3. **Lonicera.**

Stem hollow. Ovary 5-8 celled. 4. **Leycesteria.**

1. **SAMBUCUS** Linn.

Sambucus javanica Blume. Vern. *Hoklati*. Ass.

A shrub or small tree with large *pith*. *Leaves* imparipinnate; stipules small. *Leaflets* 2-6 by 1·2 to 2 in., oblong, elliptic, oblanceolate, serrate, acuminate, puberulous;

petiole 16-5 in. long. *Flowers* white, small, in terminal bracteate puberulous or almost villous corymbs; pedicels jointed; bracteoles minute. *Calyx* 3-5 toothed. *Corolla* broadly campanulate, white or pinkish, 3-5 cleft. *Stamens* 5. *Ovary* 3-5 celled, with one pendulous ovule in each cell. *Drupe* globose, black, crowned by the calyx teeth; endocarp cartilaginous.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, KAMRUP, NAGA HILLS, MANIPUR and KHASI HILLS (up to 4,000 ft.).

Roots used medicinally. Leaves used as vegetable.

Flrs. 5-8. Fr. 9-12.

2. VIBURNUM Linn.

Shrubs or small trees. *Leaves* opposite when bruised, with generally disagreeable smell. *Stipules* inconspicuous or 0. *Flowers* pentamerous, in terminal or subterminal corymbose or paniced cymes (all fertile in Indian species). *Calyx tube* turbinate or cylindric; limb 5-fid, persistent. *Corolla* rotate, tubular or campanulate, 5 lobed. *Stamens* 5. *Ovary* 1-3 celled with solitary ovule in each cell; style short; stigma 3 lobed. *Fruit* a dry or fleshy drupe, usually 1 seeded. *Seeds* oblong, compressed or concave by the endocarp projecting into the cavity; albumen uniform or ruminant.

Inflorescence umbellate :—

Drupe 1-celled. Seeds flat :—

Leaves dentate, parallel nerved, softly hairy beneath.

1. *V. corylifolium*.

Leaves remotely toothed or serrate, lowest pair of nerves basal, stellately pubescent beneath (distinctly fœtid). ..

2. *V. fœtidum*.

Leaves crenate serrate; nerves arcuate, glabrous beneath.

3. *V. Colebrookianum*.

Inflorescence pyramidal, thyrsiform :—

Leaves entire, glabrous, with a glaucous bloom when bruised.

4. *V. cylindricum*.

Inflorescence usually 3-fid cymes, arranged in terminal thyrsus. Seeds concave :—

Flowers appearing with or after the leaves :—

Albumen ruminant :—

Drupe dry, hard, blue.

5. *V. atro-cyaneum*.

Albumen uniform :—

Corolla rotate :—

Fruit succulent, spuriously 2-celled :—

Lateral nerves subparallel, remote, glandular. Drupe brownish red. .. 6. *V. odoratissimum*.

Lateral nerves close, oblique. Drupe bright red. 7. *V. Simonsii*.

Corolla tubular :—

Fruit succulent, spuriously 3-celled :—

Leaves pubescent on the nerves beneath. Drupe red. 8. *V. erubescens*.

Inflorescence terminal corymb :—

Flowers appearing before the leaves :—

Leaves serrate, parallel nerved, with tufts of hairs at the axils of nerves, distinctly fœtid. 9. *V. fœtens*.

1. *Viburnum corylifolium* Hk. f. & T. Vern. *Soh-lang*, *Dieng-soh-lang-sou*, *So-lang-ksew*, Khasi.

A straggling shrub up to 12ft. *Branchlets* and inflorescence rufous-hirsute. *Leaves* 1·3-3·7 by ·9-2·7 in., ovate or elliptic, acute, dentate, membranous, underside densely clothed with soft hairs, subcordate or rounded; lateral nerves 5-8 on either half, subparallel; petiole ·3-·5 in. *Flowers* ·2 in. across, sub-orbicular or sessile. *Calyx* stellate-hairy outside; segments obscure. *Corolla* white, rotate, hairy outside, glaucous within, 5 lobed; lobes sub-acute or orbicular. *Stamens* exserted; anthers dorsifixed. *Ovary* 1-celled; style narrowed from a broad base; stigma 3 lobed. *Drupe* globular, bright red, ·25 in. long. *Seed* flat, shallowly grooved; albumen uniform.

KHASI HILLS, 5-6000 ft.

Fruit edible.

Flrs. 3-5. Fruit. 7-9.

2. *Viburnum fœtidum* Wall. Vern. *Dieng-soh-lang*, *So-lang-ksew*, Khasi.

A shrub upto 10 ft. *Bark* greyish. *Branchlets*, petioles and inflorescence clothed with stellate hairs. *Leaves* 1·3 by ·5-1·5 in., rhomboidal or elliptic-lanceolate, mucronate, coriaceous, glabrescent above, pubescent on nerves beneath; lateral nerves 3-4 on either half, lowest pair basal; base cuneate; petiole ·2-·3 in. long. *Flowers* small in compound pedunculate umbels; bracts numerous. *Calyx* tube glabrous; teeth minute, triangular. *Corolla* short, white. *Drupe*

scarlet red, acid. *Seeds* dorsally 2-grooved, ventrally 3-grooved; albumen uniform.

KHASI HILLS upto 6,000 ft.

Flrs. 6-7. Fr. 10-11.

3. *Viburnum Colebrookianum* Wall. Vern. *Giu-porang-asing*, Miri; *Kumbad-pyrleng-doh*, Khasi; *Jongmathi*, Kuki; *Sangrima-buphang*, Mech; *Mezenga*, Ass. *Pani-phuti*, (Kam.); *Bolmichek*, Garo.

A large shrub; branches horizontal and spreading; young parts stellate, pubescent. *Leaves* drooping, 3·5-7 by 1·5-3·3 in., elliptic-oblong, shortly acuminate, crenate-serrate, thinly chartaceous, almost glabrous; lateral nerves 8-9 on either half, arcuate, almost glabrous; petiole 4·9 in. long. *Flowers* white, in erect axillary compound pedunculate umbels. *Bracts* minute; bracteoles wanting. *Calyx-tubes* glabrous; teeth minute. *Corolla* short, rotate. *Drupe* orbicular, red. *Seed* obscurely grooved; albumen uniform.

Common throughout ASSAM ascending up to 5,000 ft. (KHASI HILLS).

Pounded leaves are used to cure old sores.

Flrs. 2-4. Fr. 6.

4. *Viburnum cylindricum* Ham. Syn. *V. coriaceum* Bl. Vern. *Soh-ja-hynlan*, *Dieng-soh-ratlan*. *Dieng-soh-law*, Khasi; *Pithe-chor*, Nep.

A shrub or small tree. *Bark* greyish, fibrous; blaze whitish, turning dark-brown. *Leaves* 3·5-8·5 by 1·2-2·5 in., usually entire, oblong, lanceolate, long acuminate, coriaceous, glabrous with tufts of grey hairs at the axils of nerves; if the leaves are bruised they appear to be covered with glaucous bloom; lateral nerves 4-6 on either half, arcuate; base truncate or cuneate; petiole 5-1·5 in. long. *Flowers* sweet-scented, bluish white, in peduncled umbellate cymes. *Calyx tube* glabrous or puberulous; limb inconspicuous. *Corolla* tubular; lobes short, erect, puberulous. *Anthers* purplish, versatile. *Drupe* 2 in., black, succulent. *Seeds* dorsally 2 grooved; albumen uniform.

GOALPARA, K. & J. HILLS up to 5,000 ft.

An oil is extracted from the seeds in Nepal (Brandis).

Flrs. 7-8. Fr. 9-10.

5. *Viburnum atro-cyaneum* C. B. Clarke.

An evergreen shrub. *Leaves* 1·5-3 by ·8-1·5 in., elliptic-lanceolate or narrow oblong, acute, entire, glabrous, shining; lateral nerves 7-9 on either half, impressed above; midrib impressed above, prominent beneath; base acute or cuneate; petiole ·3-·8 in. *Drupe* ellipsoid, blue, hard, dry. *Seed* concave; albumen ruminant; the intruded testa with red resinous glands.

MANIPUR (Watt. 5978) 6-10,000 ft.; MISHMI HILLS.

Flrs. 4. Fr. 1.

6. *Viburnum odoratissimum* Ker. Vern. *Dieng-soh-lang-sniang*, Synt.

A shrub or a small tree. *Leaves* 3-4·5 by 1-1·5 in., elliptic, sub-entire or sparingly dentate, shortly acuminate, coriaceous; lateral nerves 5-7 on either side, remote and glandular; base cuneate; petiole ·5-·8 in. *Panicle* glabrous, appearing with or after the leaves. *Flowers* white or whitish yellow, fragrant. *Bracts* and bracteoles caducous, stellately hairy. *Calyx* wide with 5 short triangular teeth. *Corolla* campanulate, glabrous; lobes ·16 in., elliptic. *Drupe* ·25-·7 in. long, succulent, terete, oblong, dark-red or reddish brown, 1-seeded. *Seed* concave, transverse section half moon-shaped; albumen uniform.

Jowai and Mawmai (K. & J. Hills).

Flrs. 6-7. Fr. 8-9.

7. *Viburnum Simonsii* Hk. f. & T. Vern. *Soh-lang-eit-ksew*, Khasi.

A shrub or a small tree up to 40 ft. high. *Bark* thin, greyish outside and brownish mottled inside. *Leaves* 2·5-5·5 by ·8-2·8 in., elliptic, distantly cuspidate, dentate, short-acuminate, coriaceous, glabrous; lateral nerves 5-8, oblique, closer than *V. odoratissimum*, with tufts of greyish hairs at

the axils of nerves beneath; base rhomboid or cuneate; petiole $\cdot 4\text{--}\cdot 8$ in. long. *Inflorescence* stellate—pubescent. *Flowers* usually white, tinged with red, sweet scented. *Corolla* short, campanulate. *Drupe* bright red, $\cdot 25$ in. long.

KHASI & JAINTIA HILLS (4-6,000 ft.).

Flrs. 2-6. Fr. 8-10.

8. *Viburnum erubescens* Wall.

A small deciduous tree; young parts pubescent. *Leaves* $2\cdot 5$ by $1\cdot 2\cdot 3$ in., ovate, elliptic or sometimes suborbicular, acute or acuminate, upper part serrate, subcoriaceous, glabrous above, pubescent on the nerves beneath; lateral nerves 4-6 on either half; base rounded; petiole $\cdot 4\text{--}\cdot 9$ in. long. *Inflorescence* usually pendulous at the ends of short branches. *Flowers* white or pale pinkish. *Calyx* teeth ovate. *Corolla* tubular, $\cdot 3\text{--}\cdot 6$ in. long. *Drupe* $\cdot 25\text{--}\cdot 4$ in. long, red. *Seed* deeply grooved.

MANIPUR (Watt. No. 6560).

Flrs. 3-5. Fr. 8-10.

9. *Viburnum foetens* Dcne.

A shrub; young shoots emitting a foetid smell when bruised. *Leaves* $1\cdot 3\text{--}2$ by $\cdot 5\text{--}9$ in., elliptic, acute, cuneate, serrulate, membranous, glabrous, pubescent on the nerves beneath; lateral nerves 5-7 on either side, distantly parallel, with distinct tufts of hairs at the axils of the nerves; base acute; petiole $\cdot 2\text{--}\cdot 4$ in. *Inflorescence* pubescent or tomentose. *Flowers* appearing before the leaves, white, pinkish or rosy in lax terminal corymbs. *Bracts* deciduous: bracteoles scarious. *Calyx* $\cdot 1$ in. long; teeth minute, irregular. *Corolla* tubular; lobes spreading, $\cdot 5\text{--}\cdot 7$ in. long. *Stamens* 2, inserted near the top of the corolla tube, 3 lower down. *Drupe* ellipsoid, red. *Seed* deeply concave; albumen uniform; endocarp T-shaped.

KHASI HILLS up to 6,000 ft.
The fruit is said to be edible.

Flrs. 7. Fr. 9.

3. LONICERA Linn.

Shrubs, erect, scandent or climbing. *Bark* usually peeling off in thin shreds or papery flakes. *Leaves* opposite, entire, rarely lobed, short petioled or sessile. *Flowers* pentamerous, usually in pairs in axillary or sub-terminal peduncles or sessile in leaf axils, often connate by their ovaries, subtended by a bract and 2 bracteoles, the latter distinct or connate or sometimes absent; stipules usually absent. *Calyx tube* ovoid; limb short, 5 toothed or almost truncate, deciduous or persistent. *Corolla* tubular or funnel-shaped, often gibbous at base, limb oblique or bilabiate, 5 toothed, the upper lip 4 toothed, the lower reflexed, entire. *Stamens* 5, inserted on the corolla tube, usually near the mouth; anthers usually exserted. *Ovary* 2-3 celled; style filiform; stigma capitate; ovules many in each cell in double rows. *Fruit* a fleshy berry, distinct or connate in pairs, few seeded; albumen fleshy.

Shrubs, climbing :—

Corolla bilabiate :—

Ovaries free :—

Corolla glabrous :—

Flowers 3-5 in. Leaves fleshy. .. 1. *L. Braceana*.

Corolla hairy :—

Flowers up to 2.5 in. Leaves coriaceous. 2. *L. macrantha*.

Flowers up to 1 in. Leaves thinly membranous. 3. *L. ovata*.

Shrubs, erect :—

Corolla gibbous :—

Ovaries confluent :—

Flowers nearly sessile, .25 in. .. 4. *L. ligustrina*.

1. *Lonicera Braceana* Hemsl.

A straggling shrub or climbing. *Leaves* 4-6 by 1.5-2.5 in., oblong-lanceolate or elliptic lanceolate, pointedly acuminate, entire, coriaceous, flesh coloured, glabrous, shining above, pale beneath; lateral nerves 6-8 on either half, arched and anastomosing, tertiary nerves obscure; petiole .6-1.4 in. long, channelled; stipules represented by a transverse membrane at the base of the petiole. *Flowers* free, in pairs on solitary in axillary peduncle, (apparently) reddish outside, yellow and orange inside, 3-5 in. long. *Calyx*

5-partite. *Corolla* glabrous outside, hairy within with short stiff hairs, bilabiate, upper lip short, lower lip 1-1.25 in. long. *Stamens* 5, equal; anthers versatile; filaments and style hairy with stiff hairs. *Style* longer than the stamens; stigma capitate. Ovaries free, sessile, supported by bracts similar to calyx. *Berry* 1 by .7 in., crowned with calyx teeth.

KHASI HILLS—Umwai, Mawmloo (C. B. Clarke), Bishop's Falls, Jowai (Mann), up to 4,000 ft.

I have examined all the original sheets of G. Mann and C. B. Clarke and compared them with the Burma collection of L. *Braceana Hemsl.* I do not find any justification of calling the Khasi Hill plant L. *magnifica Brace* or L. *Regia* as proposed by C. B. Clarke. I consider all the Khasi Hill sheets are L. *Braceana Hemsl.*

Flrs. 4-7. Fr. 10-12.

2. *Lonicera macrantha* DC. Vern. *Mli-rong-khong*, *Jermei-ren*, Kh.

A climbing shrub; stem woody, wood cream coloured. *Bark* thin, rough, exfoliating. *Branchlets* and inflorescence densely clothed with long soft hairs. *Leaves* 1.3-4 by .6-2 in., oblong or oblong-lanceolate, coriaceous, ciliate, more or less rugose above and villous beneath; lateral nerves 5-7 on either half, tertiary nerves reticulate; base cordate; petiole .1-.2 in. long. *Flowers* pale white, turning pale yellow, 1.5-2.5 in. long, often arranged in dense terminal panicles; bracts linear; bracteoles small. *Calyx teeth* linear, with long soft hairs. *Corolla* glabrous outside, bilabiate. *Stamens* 5; anthers versatile. *Style* purplish, filiform; stigma capitate. *Ovaries* free. *Fruit* geminate, axillary.

KHASI HILLS up to 6,500 ft.

Flrs. 4-5. Fr. 8-9.

3. *Lonicera ovata* Ham.

A climbing shrub with cinnamon coloured smooth branches. *Leaves* 1-2 by .6-1.2 in., ovate, acute or rounded at the apex, thinly membranous, glabrous; lateral nerves about 4 on either half; tertiary nerves very finely reticulate, almost obscure; base rounded or subcordate; petiole slender, .2-.3 in. long. *Flowers* about 1 in. long, in pairs, sessile,

yellowish white, slightly scented on slender pubescent axillary peduncles, bracts ovate, lanceolate; bracteoles minute. *Calyx-tube* glabrous or ciliate. *Corolla* bilabiate; tube slender; lobes spreading, .2-.4 in. long, glabrous outside, the upper lip cut barely to the half into 4 lobes, the lower linear, .2 in. long. *Stamens* 5. *Ovaries* free; style hairy, filiform. *Fruit* a fleshy berry.

ASSAM (Brandis).

Flrs. 5-6.

4. *Lonicera ligustrina* Wall.

An erect shrub or small bushy undershrub; stem twisted. *Branchlets* pubescent. *Bark* light brown, papery. *Leaves* .4-2 by .2-.7 in., ovate to lanceolate, acute or acuminate, entire, nearly glabrous, shining above; lateral nerves inconspicuous, midrib hairy beneath; base nearly rounded; petiole .05-.2 in. long. *Flowers* greenish or creamy-white, sessile; bracts linear; bracteoles enlarged in fruit. *Peduncle* very short. *Calyx* limb tubular with a reflexed ring below the lobes; margin irregular. *Corolla* shortly elongate and gibbous at base, 5 lobed; lobes with scattered bristles. *Style* 3-fid at the extremity. *Ovaries* confluent. *Fruit* of 2 connate carpels, ruby coloured, juicy, supported by boat-shaped membranous bracteoles.

KHASI HILLS up to 6,500 ft.

Flrs. 4-6. Fr. 9-10.

4. LEYCESTERIA Wall.

Shrubs; branches herbaceous; young branches often fistular. *Leaves* distichous, sometimes stipulate. *Flowers* pentamerous, more or less zygomorphic or actinomorphic. *Inflorescence* spicate or pseudo-verticillate. *Calyx-segments* persistent, often unequal. *Corolla* funnel-shaped. *Stamens* 5, inserted on the throat of the corolla. *Ovary* 5-8 celled; style usually slender; stigma capitate; ovules numerous. *Berry* many seeded. *Seeds* minute; testa crustaceous.

Corolla zygomorphic.	..	..	..	1. <i>L. formosa</i> .
Corolla actinomorphic.	..	..	..	2. <i>L. crocothyrsos</i> .

1. *Leycesteria formosa* Wall.

A bushy shrub or undershrub with grey stem and deep green fistular branches usually from near the base. *Leaves* opposite, 2.5 by 1.3 in., stipulate, ovate or ovate lanceolate, long acuminate, entire or irregularly undulate, membranous, shining, glabrous or scabrous above, puberulous and pale beneath; lateral nerves 4-6 on either half, arcuate; base truncate or rounded; petiole .2-1 in. long, connate at the base. *Flowers* glandular-puberulous, more or less zygomorphic, 1 in. long, purplish, in bracteate whorls forming axillary or terminal drooping spikes; bracts leaf-like, sessile, greenish purple, generally connate at the base, ciliate; bracteoles variable, smaller. *Calyx* 5 lobed, unequal, persistent. *Corolla* funnel-shaped, irregularly 5 lobed. *Stamens* 5, inserted on the throat of the corolla, equalling the lobes. *Ovary* 5-celled; style slender; stigma capitate; ovules many, biseriate in each cell. *Berry* .5 in. long, subglobose, dark purple, glandular hairy, tipped with calyx limb. *Seed* minute, many.

KHASI HILLS (7737). Rare.

Flrs. 6-7. Fr. 7-8.

2. *Leycesteria crocothyrsos* Airy Shaw.

A small lax shrub, young branches fistular, terete. *Leaves* 5 by 2 in., ovate or oblong, rarely ovate lanceolate, acuminate, subremotely dentate; teeth glandular-apiculate; stipules reniform or suborbicular. *Inflorescence* terminal, villous-pubescent. *Flowers* bright orange, sessile in pseudo-verticillate receptacle, ovoid. *Calyx* shortly connate, shortly and sparsely pilose outside, glabrous inside. *Corolla* actinomorphic. *Stigma* large, capitate. *Ovary* 5 locular, many ovuled. *Fruit* not seen.

K. Ward (8150). Delei Valley. A S S A M. (Kew Bulletin No. 4, 1932. p. 170-171).

FAM. 71. RUBIACEÆ.

Trees, shrubs or herbs, erect, prostrate or scandent, sometimes thorny. *Leaves* simple, opposite or whorled with inter or intrapetiolar stipules, free or adnate to the petiole or forming a sheath round the stem. *Inflorescence* various, typically cymose. *Flowers* usually hermaphrodite, rarely unisexual, usually regular, epigynous, 4-5 merous. *Calyx-tube* adnate to the ovary; limb various (4-5), (sometimes one sepal longer than the rest and coloured). *Corolla* (4-5) gamopetalous. *Æstivation* valvate, contorted or imbricate. *Stamens* usually as many as the lobes of the corolla, inserted on the tube or mouth, alternating with the corolla lobes; anthers 2 celled. *Disk* epigynous, usually annular or cushion-shaped. *Ovary* inferior, usually 2-10 celled (rarely 1-celled); style simple or cleft; stigma various, one or more in each cell. *Fruit* various. *Seeds* various, usually with fleshy or horny albumen; embryo straight or curved; cotyledons usually flat, sometimes semiterete; radicle superior or inferior.

(In many of the genera the wood fibres have bordered pits—*Brandis*).

- I. Ovules numerous in each cell (rarely few) fruit 2-celled :—

Flowers in dense globose heads.
Corolla funnel-shaped; stigma simple :—

Erect trees or shrubs :—

Corolla lobes valvate; ovary free,
fruit often capsular.

1. Mitragyna.

Corolla lobes imbricate :—

Calyx-tube joined in a mass :—

Ovary 2-celled; ovules numerous.

2. Sarcocephalus.

Ovary 2-celled; ovules 1 in each cell.

3. Cephalanthus.

Calyx-tube free :—

Seeds not winged.

4. Anthocephalus.

- Seeds winged :—
 Stigma globose, ovoid. Heads of flowers large, few together (1 or 2). 5. **Nauclea.**
 Stigma clavate. Heads of flowers small, numerous. 6. **Adina.**
 Climbing shrubs. Peduncles hooked. 7. **Uncaria.**
- II. Ovules numerous; flowers not in dense globose heads. Capsule 2-celled; seeds winged :—
 Corolla lobes valvate; bracts foliaceous, persistent :—
 Style 2-fid, epiphytic shrubs. .. 8. **Hymenopogon.**
 Style entire, usually trees. .. 9. **Hymenodictyon.**
 Corolla lobes valvate; lobes fringed. 10. **Cinchona.**
 Corolla lobes imbricate; style 2-fid. 11. **Luculia.**
- III. Ovules numerous; flowers in trichotomous panicles. Capsule 2-celled; seeds angular (not winged) :—
 Corolla lobes twisted in bud. .. 12. **Wendlandia.**
- IV. Ovules numerous; flowers not in dense globose heads. Capsule 2 or 4-celled or cocci 2-4 :—
 Corolla lobes valvate :—
 Leaves entire :—
 Stamens 4 :—
 No interposed teeth between calyx teeth. 13. **Hedyotis.**
 With broad intervening sinuses between the calyx teeth. .. 14. **Anotis.**
 Stamens 5 :—
 Capsule small, subglobose. .. 15. **Polyura.**
 Capsule compressed, broadly didymous, obcordate. .. 16. **Ophiorrhiza.**
 Leaves dentate :—
 Stamens 2. 17. **Silvianthus.**
- V. Ovules numerous. Fruit a berry or drupaceous. Seeds minute. Corolla valvate :—
 Inflorescence terminal :—
 Calyx with one lobe usually enlarged and coloured. .. 18. **Mussaenda.**
 Inflorescence axillary :—
 Calyx teeth 4-6, persistent; stamens 4-6. 19. **Mycetia.**
 Calyx teeth 5, persistent; stamens 5. 20. **Myrioneuron.**
- VI. Ovules few or numerous in each cell (except *Webera*). Fruit berry. Seeds large :—

- Inflorescence terminal :—
 Flowers 5 merous :—
 Bisexual :—
 Stigma fusiform. **21. Webera.**
 Diœcious :—
 Style-arms 2. **22. Brachytome.**
 Inflorescence axillary or supra-axillary :—
 Stigma fusiform :—
 Corolla lobes 5 or more; ovary 1-celled. **23. Gardenia.**
 Corolla lobes 5; ovary 2-celled. **24. Randia.**
 Style bifid; ovules 2-10 in each cell. **25. Hyptianthera.**
 Style bifid; ovules 2 or 3 in each cell. **26. Tricalysia.**
- VII.** Ovules solitary in each cell. Corolla lobes valvate. Stamens inserted on the mouth of the corolla :—
 Fruit of 2 cocci.
 Seeds compressed dorsally :—
 Herbs; fruit very small. **27. Knoxia.**
 Drupe with 2-many free or united pyrenes. Seeds various :—
 Corolla lobes valvate :—
 Ovary 2-celled; stigma large, usually lobed. **28. Canthium.**
 Ovary 5-celled; stigma 4-5 lobed. **29. Vangueria.**
- VIII.** Ovules solitary in each cell. Corolla lobes twisted in the bud; radicle superior :—
 Inflorescence terminal, paniced or corymbose :—
 Leaves and bracts coriaceous; style less than twice the length of corolla tube. **30. Ixora.**
 Leaves membranous, bracts membranous, lower sheathing; style twice the length of corolla tube. **31. Pavetta.**
 Inflorescence axillary, fascicled or solitary. **32. Coffea.**
- IX.** Ovules solitary in each cell. Corolla lobes valvate; radicle inferior. Fruit capsular or of 2 cocci or pyrenes; leaves fœtid when bruised :—
 Capsule 5 valved at the base; style-arms 5; erect shrubs. **33. Leptodermis.**

Pyrenes (2) flat, orbicular or elliptic; styles 2 capillary; twining shrub.

34. Pæderia.

- X. Ovules solitary. Corolla lobes valvate; radicle inferior; ovules amphitropous. Fruit drupaceous or baccate :—

Calyx tube cohering; limb truncate :—

Flower heads dense, many flowered.

35. Morinda.

Calyx tube free :—

Calyx limb 4-5 fid. Corolla throat villous. Fruit a Drupe. ..

36. Damnacanthus.

Calyx truncate. Corolla throat glabrous. Fruit a Berry. ..

37. Prismatomeris.

- XI. Ovules solitary. Corolla lobes valvate; radicle inferior; ovules basal erect. Fruit drupaceous or baccate :—

Flowers in terminal trichotomous cymes :—

Ovary 2-celled :—

Corolla tube short, straight.

Calyx 4-5 toothed.

38. Psychotria.

Corolla tube slender, curved.

Calyx 5 toothed.

39. Chasalia.

Corolla bell or funnel shaped; cymes often few flowered; calyx limb dilated, unequal, 4 toothed.

40. Saproisma.

Flowers in axillary clusters or short cymes :—

Ovary 4-9 celled. Corolla bell or funnel-shaped. Calyx 3-6 toothed.

41. Lasianthus.

- XII. Ovules solitary in each cell. Corolla valvate; ovules amphitropous. Ovary usually 2-celled :—

Fruit of 2 separate cocci both or one dehiscing ventrally. ..

42. Borreria.

- XIII. Ovules solitary in each cell. Corolla lobes valvate in bud. Ovary 2 celled; ovules basal. Fruit indehiscent, coriaceous or fleshy. Seeds peltate. Leaves whorled, exstipulate :—

Corolla 5 merous.

43. Rubia.

Corolla 4 merous.

44. Gallum.

1. MITRAGYNA Korth.

Shrubs or trees. *Leaves* petiolate, usually with transverse parallel nerves; stipules large, caducous. *Flowers* pentamerous, yellowish, in globose axillary or terminal solitary or paniced pedunculate heads, each surrounded by foliaceous bracts; often they are petiolate and subpersistent. *Calyx tube* short, obconic, truncate or 5 toothed. *Corolla* funnel-shaped; tube long; throat glabrous or pilose; lobes 5, valvate. *Stamens* 5 on the throat of the corolla; filaments short, filiform; anthers oblong, apiculate. *Ovary* 2-celled; style filiform; stigma mitriform; ovules many, imbricate on pendulous placenta. *Fruit* a globose head of 2 dehiscent cocci. *Seeds* campanulate, suborbicular; testa winged: albumen fleshy; cotyledons flattened; radicle superior.

Corolla lobe glabrous without :—

Calyx limb short but distinct. Flower heads single or in cymes of three :—

Bracteoles hairy at apex. ..

1. *M. parvifolia*.

Calyx limb 0. Flower heads in ample trichotomous cymes. Bracteoles glabrous.

2. *M. diversifolia*.

1. *Mitragyna parvifolia* Korth. (*Stephegyne parvifolia* Korth).

A large deciduous tree; trunk irregularly shaped, often buttressed. *Bark* light brownish or greenish-grey, smooth with shallow depressions left by exfoliation, light pinkish white inside, soon turning to deep brown, very fibrous. *Leaves* very variable in size and shape, elliptic-orbicular, oblong, ovate or obovate, bluntly acuminate, coriaceous, glabrous above, thickly pubescent beneath; lateral nerves 6-8 pairs, oblique; base cuneate to subcordate; stipules keeled, obovate, membranous, covering the buds and falling in thin expansion. *Flowers* light white or yellow in globose pedunculate heads about 1 in. in diameter. *Heads* solitary, terminal or in cymes of 3; bracteoles spatulate, minute. *Calyx-tube* short, truncate or minutely 5 toothed. *Corolla* narrowly funnel-shaped or trumpet-shaped; lobes 5, valvate. *Stamens* 5, inserted on the throat of the corolla tube; anthers apiculate; filaments short. *Ovary* 2-celled; style filiform,

much exserted, mitriform; base hollow. *Capsules* in globose head of 100-150, dry, .12 in. long, splitting into 2 dehiscent cocci. *Seeds* many, winged, minute.

Fulbari—GARO HILLS.

Wood light pinkish brown, close, fine grained, and generally harder than that of *Adina cordifolia*. Uses similar.

Flrs. 6-7. Fr. 12-2.

2. *Mitragyna diversifolia* Haviland. Modern name *M. rotundifolia* (Roxb.) O. Ktze. Vern. *Sealphusri*, Nep.; *Timi*, Ass.; *Itum-po-arong*, Mik.; *Bonstip*, *Bonsodeb-phang*, Kach.; *Tong-khop-nopang-thing*, Kuki; *Bonsodeb-phang*, Kach.; *Tong-khop-nopang-thing*, Kuki; *Bor-champa* or *Lawa*, Sylh.; *Thinglung*, Lushai; *Choibong*, *Mankhup-thing*, Tipp.; *Lotumpoh-arong*, Mik.

A deciduous middle-sized tree. *Leaves* 3-8 by 1-7 in., orbicular, broadly ovate or elliptic or shortly acuminate, glabrous or finely pubescent; lateral nerves 7-9 on either half, subparallel; base rounded, cordate or attenuate; petiole .5-1.5 in. long; stipules obovate, .5-.7 in. long. *Flower-heads* greenish white, often lateral in ample trichotomous cymes with or without foliaceous bracts which are petiolate and persistent; bracteoles glabrous, hirsute along the upper part of the margin. *Calyx* short; limb obscure, hirsute along the margin. *Corolla* .2 in. *Cocci* ribbed. *Seeds* winged at both ends.

NOWGONG (Lumding, Lanka); N. CACHAR HILLS (Haflong); LUSHAI HILLS, CACHAR.

Flrs. 3-7. Fr. 8-2.

2. *SARCOCEPHALUS* Afzel.

***Sarcocephalus cordatus* Miq.** Modern name *Nauclea orientalis* L (1762) Vern. *Thing-ka*, Kuki.

A middle-sized deciduous tree. *Bark* dark grey, somewhat rough outside, light dun yellow inside, somewhat soft. *Leaves* 5-12 by 4-8. (Hooker), suborbicular, broadly ovate or elliptic-ovate, obtuse, entire, thinly coriaceous, glabrous, puberulous beneath; lateral nerves 7-8 on either half, subparallel; base rounded, often cordate; petiole .7-1 in. long; stipules ovate, oblong, blunt. *Heads* globose, somewhat

nodding, 1 in. across, solitary, terminally on axillary shoots and axillary at the end pair of leaves. *Flowers* small, yellowish, fragrant, sessile, ebracteolate, more or less free. *Peduncle* 1-1·5 in. long. *Calyx-segments* clavate, minutely hairy. *Corolla* quite glabrous, ·25 in. long; lobes imbricate, obtuse. *Stamens* inserted on the mouth of the corolla tube; anthers sessile, acute. *Ovary* 2-celled; style exserted; stigma fusiform; ovules numerous. *Fruit* ·6-1 in. across, a globose fleshy syncarpium, but hardly cohering. *Seeds* few, ovoid, compressed, minute, not winged; albumen fleshy; embryo rather large.

CACHAR (Bhuban Hill).

Believed to be anthelmintic.

Flrs. 6-7. Fr. 11-12.

3. CEPHALANTHUS Linn.

Cephalanthus occidentalis Linn. Vern. *Thengmi-rokarong*, Mik.; *Panikadam*, Ass.; *Dingla-miksiai*, Synt.; *Kadamphuli*, Upper Assam.

An evergreen elegant shrub or small tree; all young parts more or less pubescent or tomentose. *Bark* grey, deeply furrowed, salmon brown and spongy inside, ·5-·7 in. thick, soft, turning deeper brown, almost gregarious in swampy localities. *Leaves* 3-5 by 1-2 in., opposite or in whorls of 3 or 4, elliptic, ovate, ovate-lanceolate, acuminate, entire or undulate, membranous, glabrescent above, more or less pubescent beneath; lateral nerves 10-12 on either half, subparallel; rounded or narrowed at the base; petiole ·2-·8 in. long; stipules acuminate, often gland tipped. *Flowers* white, fragrant, sessile on globose heads of ·5 in. in diameter on 1-2 in. long puberulous peduncles arranged in terminal trichotomous leafy panicles or sometimes solitary in the axils of the uppermost leaves; bracteoles clavate. *Calyx* campanulate, woolly inside; segments usually 4-5, rounded. *Corolla* trumpet-shaped; lobes usually 4-5, imbricate, alternating with black gland dots at the sinus. *Stamens* 4, inserted on the mouth of the corolla; filaments short; anthers bicuspidate at the base usually. *Ovary* glabrous, 2-celled, not confluent; style filiform; stigma clavate; ovules solitary, pendulous.

Fruit compressed of numerous 1-seeded cocci. *Seeds* shortly winged at the apex, arillate; albumen horny.

NOWGONG, CACHAR, UPPER ASSAM, KHASI HILLS.

Flrs. 3-5 or throughout the year.

C. naucleoides DC Prodr. is also found in Assam.—R. N. De.

4. ANTHOCEPHALUS A. Rich.

Anthocephalus Cadamba Miq. Modern name *A. indicus* A. Rich. Vern. *Logchu-arong*, Mik.; *Banthalang*, Lushai; *Donlin*, Kardam, Tipp.; *Roghu*, Ass.; *Mi-bol*, Garo; *Kodom*, Sylhet, Cach.; *Gongdok*, Maupa, Kalam-phang, Kach.; *Naranpadum*, Kuki; *Nipang-lulangasing*, Miri; *Dieng-soh-lang-pathi*, Khasi.

A large handsome deciduous tree with very straight cylindric stems and horizontal branches, more or less whorled. *Leaves* 5-10 by 2-4 in., ovate, elliptic-oblong, coriaceous, shining or glabrous above, pubescent beneath, acuminate; lateral nerves 8-10; base cuneate or obtuse; petiole 5-1.5 in.; stipules caducous, linear-lanceolate. *Flowers* pentamerous, small, orange coloured, united by the confluent calyx tube, in dense terminal solitary peduncled globose heads; bracts stipular; bracteoles wanting. *Calyx* segments 5, imbricate, oblanceolate, persistent. *Corolla* funnel-shaped; lobes 5, imbricate; throat glabrous. *Stamens* 5, inserted on the throat of corolla; filaments short; anthers ovate, sagittate, apiculate. *Ovary* 4 celled above, 2 celled below; style exserted; stigma white, narrowly clavate; ovules very many on bifid placentas. *Pseudocarp* large, fleshy, orange coloured, 2-2.5 in. across. *Seeds* minute, angular, not winged; albumen fleshy; embryo clavate.

Common throughout ASSAM.

Wood soft, white or reddish. Used for packing boxes, planks and manufacture of matches.

Flrs. 12-7. Fr. 5-10.

5. NAUCLEA Linn.

Trees or shrubs. *Leaves* petiolate or sessile; stipules large, caducous or sub-persistent. *Flowers* pentamerous, sessile, in solitary or crowded globose pedunculate heads. *Peduncles* terminal, often thickened near the apex; bracts often large,

caducous; bracteoles smooth, subulate. *Calyx* tube pruinose, not united with each other; segments 5, deciduous, linear, subulate, usually tipped with valvate processes. *Corolla* infundibuliform; lobes 5, short, imbricate; throat glabrous. *Stamens* 5, on the throat of the corolla; anthers oblong or linear, included. *Ovary* 2-celled; style long, thickened; stigma globose; ovules numerous, pendulous. *Fruit* .7 in., of 2 dehiscent many seeded cocci (.2 in.), which are pubescent outside. *Seeds* flattened, winged; embryo clavate.

Calyx lobes purplish. Corolla glabrous.
Leaves shortly petioled; base narrowed
into the petiole.

1. *N. Griffithii*.

Calyx lobes not purplish. Corolla grey-
pubescent. Leaves almost sessile from
a cordate base.

2. *N. sessilifolia*.

1. *Nauclea Griffithii* Haviland (= *Adina Griffithii* Hook. f.) Vern. *Dieng-soh*, Khasi.

A large tree, buttressed, often with a few ærial roots. *Bark* greenish-grey, with vertical fissures at places and with faint horizontal wrinkles, covered with numerous dark brown warts; inside pale dun-brown to rosy pink, finely and somewhat mattedly fibrous. *Leaves* 4-7 by 1.5-4 in., elliptic-oblong, obovate or sub-orbicular, obtusely mucronate, thinly coriaceous, glabrous, minutely punctate beneath; lateral nerves 8-10 on either half, tertiary nerves finely reticulate; base narrowed into the petiole; petiole .2-.6 in. long. *Peduncles* 1-3, terminal, flattened up to the bracts, club-shaped above, 1.5-3 in. long, speckled with lenticels. *Flower buds* usually purplish, pale, slightly scented; bracteoles club-shaped, rusty hairy. *Calyx* white, hairy, becoming bristly in fruit. *Corolla* glabrous; lobes imbricate with minute purple tips, ovate; stigma exserted, globose. *Capsule* flatly 4-gonous, .3 in.

Barapani, Nongkhlaw (KHASI HILLS), MANIPUR (Watt No. 7295) ascending upto 4,000 ft.

Flrs. 9. Fr. 12-2.

2. *Nauclea sessilifolia* Roxb.

A large deciduous tree. *Leaves* 3-5 by 2-4 in., ovate or elliptic-oblong, obtuse, entire, coriaceous, glabrous, dark green

above, pale beneath; lateral nerves 7-9 on either half, rigid, arched, almost sessile from a cordate base. *Heads* terminal on robust mostly solitary peduncles, 2-3 in. long. *Flowers* shaggily silky. *Calyx-segments* 5, clavate, villous, acute. *Corolla* lobes adpressed, grey, pubescent or villous. *Stigma* clavate. *Capsule* .3 in.

CACHAR.

Flrs. 11-12. Fr. 3-4.

Nauclea orientalis L. described under *Sarcocephalus cordatus* Miq.

6. ADINA Salisb.

Tall or small trees, deciduous or evergreen. *Leaves* petioled; stipules large, caducous on its development. *Flowers* pentamerous, small with numerous filiform bracteoles, densely crowded in solitary or paniced globose heads. *Calyx* tube angled; segments 5, distinct. *Corolla* funnel-shaped or tubular; lobes 5, valvate; throat glabrous. *Stamens* 5, on the mouth of the corolla; filaments short. *Ovary* 2-celled; style filiform; stigma clavate or capitate; ovules many. *Capsule* small of 2 cocci dehiscent from below, many seeded. *Seeds* oblong, winged; endosperm copious, fleshy.

Leaves cordate (orbicular or broadly ovate). Calyx segments linear, pubescent beneath, deciduous.

1. *A. cordifolia*.

Leaves lanceolate, elliptic-lanceolate or oblanceolate, glabrous and glossy (like mango leaves). Calyx segments oblong-obtuse, persistent.

2. *A. polycephala*.

Leaves oblong or elliptic, slightly puberulous beneath. Calyx limb entire (not distinctly lobed), persistent.

3. *A. oligocephala*.

1. *Adina cordifolia* Hk. f. Vern. *Phinkona*, Jharua; *Tarakchapa* Ass.; (*Goalp.*); *Karan*, Nep.; *Komalbola*, Rava; *Sandang*, Garo; *Bagting-phang*, Kach.; *Ting-khop-thing*. Kuki; *Haldu*, Hind.; *Dieng-thing-pholo*, *Thing-pholo-arong*. Khasi; *Lanpatia*, Ass., (*Kamrup*).

A large deciduous tree with a spreading crown, trunk usually buttressed at the base. *Bark* light grey, .75 in. thick, exfoliating in patches; blaze light red inside with white

streaks, wood yellow; young parts pubescent. *Leaves* 3-9 in. long, and broad, broadly ovate or orbicular-cordate, abruptly acuminate, coriaceous, glabrate above, pubescent beneath; lateral nerves 5-8 pairs, basal pair branching close to the midrib; petiole 1·2-4·5 in.; stipules ·5-1 in. long, elliptic-obovate, concealing the terminal bud. *Flowers* yellow in globose, pedunculate heads. *Calyx tube* 5, angled-pubescent outside; segments 5, valvate. *Stamens* 5, on the mouth of the corolla; filaments short. *Ovary* 2-celled; ovules many in each cell; style filiform, exserted; stigma clavate. *Fruit* of numerous capsules each separating into 2 dehiscent cocci. *Seeds* minute, many, winged; endosperm copious, fleshy.

Common throughout the Province with the exception of UPPER ASSAM.

Wood yellow when fresh cut, afterwards changing into reddish brown, compact, moderately hard; wt. 40-50 lbs. per c.ft. Heart wood and annual rings not distinct, seasons well, takes a good polish and is fairly durable. Suitable for turnery, manufacture of combs, furniture and agricultural implements.

Flrs. 4-7. Fr. 8-1.

2. *Adina polycephala* Benth. Vern. *Thing-khum*, Lush.; *Thukel*, Kuki.

A small tree, trunk obscurely fluted; young branches slender, striate. *Bark* grey or brownish rough, exfoliating in irregular flakes, ·25 in. thick; inside reddish, turning dark-brown, fibrous. *Leaves* 3·5-7 by ·9-2 in., lanceolate or elliptic, lanceolate or oblanceolate, entire, caudate, acuminate, coriaceous, glabrous, glossy green (like mango-leaves); lateral nerves 7-10 on either half, subparallel, arcuate, obscure towards the apex; petiole ·2·5 in. long. *Heads* small, ·35 in. across, pedunculate, in trichotomously branched terminal, panicles, ramification slender; peduncles and pedicels glabrous or puberulous. *Calyx-tube* short, pubescent; segments oblong—obtuse, persistent. *Corolla* glabrous, tube ·1 in. long; lobes 4-5, ovate, persistent. *Style* exserted; stigma clavate. *Capsules* obovoid, crowned by the calyx limb. *Seeds* minute, very shortly winged.

K and J. HILLS, LUSHAI HILLS and CACHAR.

Flrs. 10-12. Fr. 3-4.

3. *Adina oligocephala* Havi. Vern. *Haludsapa*, Dimapur (Sibsagar).

A middle sized tree. *Leaves* 4·9·5 by 2·5·4·5 in., oblong or elliptic, bluntly acuminate, entire, thinly coriaceous, glabrescent above, slightly puberulous beneath; lateral nerves 4·5 on either half, prominent beneath, more or less parallel, arcuate; base acute, sometimes unequal; petiole ·4·1·6 in. long. *Flowers* in trichotomous, leafy paniced heads, which are about 1 in. diameter. *Calyx* limb entire (not distinctly lobed), persistent. *Corolla* funnel-shaped; lobes ovate. *Style* exserted; stigma, clavate. *Capsules* obovoid, slightly oblique; crowned by the calyx limb. *Seeds* minute.

NOWGONG, SIBSAGAR, KHASI HILLS.

Flrs. 1-2. Fr. 3-4.

7. UNCARIA Schreb.

Climbing shrubs with axillary tendrils (sterile peduncles) often changed into recurved hooks. *Branchlets* usually angular. *Leaves* petiolate; stipules entire or bifid. *Flowers* in globose axillary and terminal, solitary or paniced heads. *Peduncles* become woody ultimately on development; bracts in pairs; pedicels sometimes elongated in fruit. *Calyx-tube* fusiform, 5 fid or partite. *Corolla* long, funnel-shaped, throat glabrous; lobes usually valvate. *Stamens* 5, adnate to the throat of the corolla; filaments short; anthers with 2 basal bristly appendages. *Ovary* 2-celled; style slender; stigma generally capitate; ovules many. *Fruit* a head of elongated septicidally 2-valved many seeded capsules. *Seeds* small with testa winged at both ends; albumen fleshy.

Capsule pedicellate; bracteoles 0. Corolla tube hirsute. Calyx-segment linear.

1. *U. macrophylla*.

Capsule sessile; bracteoles filiform :—

Calyx segments linear. Leaves hirsute; lateral nerves 9.

2. *U. pilosa*.

Calyx limb entire or segments very short :—

Lateral nerves 7-8. 3. *U. homomalla*.

Lateral nerves 4-5 :—

Leaves submembranous (not glaucous). 4. *U. lævigata*.

Leaves coriaceous, glaucous beneath. . . 5. *U. sessilifructus*.

1. *Uncaria macrophylla* Wall. Vern. *Barasilata*, Ass.; *Baira*, Kach.; *Apua-chuni-rikang*, Mik.

A large woody climber; stem ribbed. *Branchlets*, petioles and peduncles rusty pubescent. *Leaves* 4-6·5 by 2·5-4 in., entire, ovate, oblong, bluntly acuminate, glabrous, rusty-tomentose beneath; lateral nerves 6-8 on either side, veins reticulate, prominent beneath; base subcordate; petiole ·1-·3 in. long. *Flowers* (16-200 in each head) in slender pedunculate terminal as well as axillary heads. *Peduncles* bracteate near the top. *Calyx* segments linear, as long as tube. *Corolla* hirsute outside. *Capsule* about ·17 in. long, spindle-shaped. *Fruiting* pedicels as long or longer than the capsule. *Seeds* very minute.

SYLHET, SIBSAGAR, LAKHIMPUR, N. CACHAR HILLS.
Flrs. 12-1. Fr. 1-2.

2. *Uncaria pilosa* Roxb. Vern. *Subekbek*, Mik.

A large, stout, straggling and climbing shrub. *Branchlets* pubescent, obscurely angled. *Bark* greyish white, warty, having minute rectangular fissures. *Leaves* 2-6 by 1-3 in., entire-ovate, elliptic, acuminate, sub-membranous, pilose or scaberulous above, pubescent beneath; lateral nerves 8-10 on either half; base subcordate or rounded; petiole ·1-·3 in. long; stipules recurved. *Flowers* light green to dun-yellow, scented, in axillary stout pedunculate heads. *Peduncles* gradually narrowed from a thick base, bracteate in the middle; tomentose. *Calyx* hirsute; segments linear pubescent, as long as tube. *Corolla* tube very slender, yellowish. *Capsules* clavate, almost sessile, tipped by the long calyx segments.

LAKHIMPUR, N. CACHAR, SIBSAGAR.

Flrs. 4-5. Fr. 7-9.

3. *Uncaria homomalla* Miq.

A climber; branches pubescent. *Leaves* 2-3 by 1-1·6 in., oblong, ovate, elliptic-lanceolate, acuminate, subcoriaceous, glabrous above, (puberulous on the nerves only), sparsely hirsute beneath; lateral nerves 7-8 on either half, subparallel, impressed above, prominent beneath; petiole ·3-·4 in. long, hirsute; stipules bilobed; segments subulate, hirsute. *Peduncles*

pubescent, axillary, solitary, tapering upwards from a stout base, bracteate above the middle; bracteoles filiform. *Heads* .6 in. across. *Flowers* sessile. *Calyx* limb obscurely toothed; segments ovate. *Corolla* tube .3 in. long, hirsute. *Receptacle* small, hirsute. *Capsule* not seen.

LUSHAI HILLS (Fort Lungleh., Gage No. 28).

Flrs. 3.

4. *Uncaria lævigata* Wall.

A large scandent shrub, branches 4-angled. *Leaves* 3.5-6 by 2.4 in., elliptic or ovate-lanceolate, bluntly acuminate, submembranous, glabrous, shining above; lateral nerves 4-6 on either half, slender, arched, tertiary nerves finely reticulate, almost invisible; base usually rounded; petiole .2-.4 in. long, supported by a hooked axillary spine; stipules 2-fid. *Flowers* small, (about .6 in. long), sessile in solitary pedunculate head (.2-.3 in. across in buds, 1.5 in. across when flowers are mature). *Calyx* obscurely toothed. *Corolla* filiform, glabrous. *Capsules* sessile, .25-.5 in. long.

KHASI HILLS (Tharia, 45023—Clarke) 1,000 ft.: MANIPUR (Walt 7294) 5,000 ft.

Flrs. 10. Fr. 4.

5. *Uncaria sessilifructus* Roxb. Vern. *Sarpi-chaithi-rikang*, Mik.; *Boira-dhuka*, *Boira*, Kach.; *Nupang-rakroi*, Kuki; *Boroki-ankora*, *Barakhialata*, Ass.; *Dahini-lahiri*, Nep.; *Dumilsibudu*, Garo; *Borhi-kata*, Ass. (Kam.).

An extensive climber; stem woody. *Branches* 4-angled; young shoots and leaves red with pubescent curved axillary hooks. *Leaves* 2.4.5 by 1.2.8 in., elliptic, bluntly acuminate, entire, thinly coriaceous, glabrous, shining above, pale beneath, somewhat glaucous; lateral nerves 3-5 on either side; tertiary nerves finely reticulate; base somewhat rounded; petiole .2-.5 in. long. *Flowers* in 1-1.5 in. long in slender pedunculate axillary or terminal paniced heads, bracteate in the middle. *Calyx* segments very short, rounded. *Corolla* tube slender; lobes yellowish, glabrous and silky. *Capsules* sessile, turgid and pubescent.

Common throughout ASSAM.

Flrs. 10-11. Fr. 12-2.

8. HYMENOPOGON Wall.

Small epiphytic shrubs. *Leaves* deciduous; stipules large, persistent with fleshy axillary bristles. *Flowers* white, corymbose; bracts large, foliaceous, reticulated. *Calyx* 5-partite, persistent. *Corolla* salver-shaped; tube long; lobes 5. *Stamens* 5, included in the inflated summit of the tube. *Ovary* 2 celled; style filiform; stigmas 2, linear; ovules many. *Capsules* crowned with the calyx, opening at apex in valves, many seeded. *Seeds* long, tailed at both ends; embryo minute; albumen copious.

Leaves oblanceolate, elliptic or obovate-lanceolate; lateral nerves 12-20 on either half.

Corolla 1.5-2 in. 1. *H. parasiticus*.

Leaves subfalcate, lanceolate; lateral nerves 28-35 on either half. Corolla .7 in. 2. *H. assamicus*.

1. Hymenopogon parasiticus Wall.

A deciduous straggling (usually) epiphytic shrub. *Bark* smooth, pale brown, exfoliating in papery pieces. *Leaves* 3-10 by 1.4 in., crowded towards the ends of branches, obovate—oblanceolate or elliptic, lanceolate—acuminate, membranous, puberulous on both surfaces, green above, pale beneath; lateral nerves prominent beneath, 12-20 on either half; base attenuate; petiole .2-.5 in. long. *Flowers* white, conspicuous, in corymbs; primary branches usually bearing long petioled, white leafy, reticulated bracts. *Calyx* puberulous; segments linear. *Corolla* white, 1.5-2 in. long; lobes spreading, usually hairy towards the margin. *Capsules* .5-.7 in. long, sessile, torpedo-shaped, pubescent, crowned with the persistent, calyx segments, bluish white when ripe. *Seeds* conspicuously long, tailed at both ends.

KHASI HILLS—Mairang (on *Quercus dealbata*), Shillong Peak, Serrarim—4-6000 ft.

Flrs. 6-7. Fr. 8-10.

2. Hymenopogon assamicus Hk. f.

A small straggling shrub. *Leaves* 9-12 by 2.2-5 in., lanceolate, finely acuminate, subcordate, glabrous; lateral nerves 28-35 on either half, almost straight, subanastomosing near the margin to form an intramarginal vein, tertiary nerves

inconspicuous; base cuneate; petiole $\cdot 4\text{--}\cdot 8$ in. long, margined; stipules $\cdot 6$ by $\cdot 4$ in., ovate—acuminate, membranous. *Flowers* $\cdot 6\text{--}\cdot 8$ in. long, in much branched bracteate racemes, the whole forming a terminal panicle about a foot long. *Calyx* urn-shaped. *Corolla* slightly pubescent without. *Style* slightly exserted. *Floral* leaves narrow, lanceolate, $2\cdot 5\text{--}3$ in., strongly reticulate. (Fruit not seen.)

(From G. Mann's original sheet in Calcutta Botanic Garden).

KHASI HILLS.

9. HYMENODICTYON Wall.

Trees or shrubs with bitter bark and soft wood. *Leaves* petioled, deciduous; stipules usually glandular—serrate, deciduous. *Flowers* usually pentamerous, in simple racemes or panicles, with a few large leafy reticulate persistent bracts; bracteoles deciduous. *Calyx* tube ovoid; segments deciduous. *Corolla* tube slender, expanding in a campanulate or funnel-shaped 5-lobed limb; lobes valvate. *Stamens* 5, inserted below the corolla throat; filaments short, attached to the back of broad connective; anthers linear. *Ovary* 2-celled; style filiform, exserted; stigma capitate; ovules many. *Capsule* loculicidally 2 valved. *Seeds* numerous, winged all round, bifid below; albumen fleshy; embryo minute.

Flowers pedicellate, in compound paniced racemes. Leaves pubescent.

1. *H. excelsum*.

Flowers nearly sessile, fasciculate, in drooping simple spikes. Leaves pubescent, along the nerves beneath when young, afterwards glabrous.

2. *H. flaccidum*.

1. *Hymenodictyon excelsum* Wall. Vern. *Kodom*, *Phurkundi*, *Bhurkhundi*, Ass.; *Inglongallokoho-arong*, *Lo-keho*—*arong*, Mik.; *Bon-homjeng*, Kach.; *Choi-bong-thing*, Kuki; *Kel-kodom*, Mech; *Ding-dolobong-sir*, Khasi; *Bodi-kiru-chongipa*, *Wakandi*, *Boldikam*, *Mebol*, Garo; *Baja-phuty*, (Kamrup); *Lati-korum*, Nep.; *Uthamban*, Manip.

A large deciduous tree. *Leaves* turning yellowish before falling. *Bark* brownish-grey, smooth on branches and poles, soft and corky on old stems; inside softly fibrous, light-dun with broad distant white streaks, 1 in. thick. *Leaves* $4\text{--}9$ by $2\cdot 5\text{--}5$ in., elliptic-ovate or obovate—oblong, acuminate,

membranous, pubescent; lateral nerves 7-10 on either half; base narrowed into the petiole or acute; petiole 1-3 in. long; stipules oblong, with a broad base, caducous, usually glandular—serrate. *Flowers* white, fragrant, .2-.3 in. long, densely crowded on terminal branched panicles; bracteoles minute; pedicels slender. *Calyx* minute, pubescent; segments deciduous, acute. *Corolla* pubescent outside; tube more than 3 times the length of calyx lobes, slender; limb cup-shaped; lobes 5, valvate. *Stamens* 5, inserted below the throat of the corolla; filaments dilated upwards. *Ovary* 2-celled; ovules many; style slender, long-exserted; stigma capitate. *Capsules* ellipsoid, .6-1 in. long, reddish-brown when ripe, on recurved pedicels, 2 valved, many seeded. *Seeds* many, lenticular, winged all round; wing deeply cleft at the base.

KAMRUP, NOWGONG, N. C. HILLS, SIBSAGAR and CACHAR.
Leaves used as buffalo fodder.

Flrs. 7-8. Fr. Cold season.

2. *Hymenodictyon flaccidum* Wall. Vern. *Meisyrkan*, Khasi.

In Mr. Gamble's opinion it is an epiphyte but according to Sir G. King Wallich's *H. flaccidum* was a tree; (found growing epiphytically on a huge *Cinnamomum Tamala* tree (5243) at Tura, Garo Hills and also growing on rocks at Nongkhlaw, Khasi and Jaintia Hills (6358); young shoots warty. *Leaves* 3-11 by 3-6.5 in., elliptic, obovate, acuminate, membranous, minutely pubescent beneath, especially along the nerves when young, afterwards glabrous; lateral nerves 7-9 on either half, sub-equidistant, slender, arched; petiole 2-6 in.; stipules membranous, broadly ovate, caducous. *Flowers* almost sessile, spicate, 5-9 in. long, each spike-like; raceme being supported by an elliptic or lanceolate bract, 3 by 1.4 in., stalk 2-3 in. long. *Calyx* narrowly cup-shaped. *Corolla* glabrous; tube short, less than twice the length of calyx lobes. *Style* exserted. *Capsules* reflexed, .6 in., sparingly spotted. *Seeds* with membranous bifurcate wings, margins of which are lacerated.

GARO HILLS, (Tura Sanitorium.) KHASI & JAINTIA HILLS (Nongklaw).

Flrs. 6-8. Fr. 10-12.

10. CINCHONA Linn.

Evergreen shrubs or trees, bark bitter, coppices freely; stipules deciduous. *Flowers* pentamerous, scented in terminal panicles. *Calyx* pubescent outside, 5-toothed, persistent. *Corolla* tubular, pubescent outside; lobes valvate in bud; margin pilose. *Ovary* 2-celled; style filiform, bifid; papillose inside. *Capsule* 2-celled, 2-valved, with septicidal dehiscence from the base. *Seeds* many, peltate, winged; edges lacerated; albumen fleshy.

Pits in the axils of secondary nerves not present:—

Flowers red in short corymbiform cymes.

Corolla tube densely silky. 1. *C. officinalis*.

Flowers pale, flesh-coloured in pyramidal panicle; cymes few fld. Corolla lobes only

fringed with hairs. 2. *C. Calisaya*.

Pits in the axils of secondary nerves not present:—

Leaves glabrous. Flowers yellowish-white. 3. *C. Ledgeriana*.

Leaves softly pubescent or tomentose.

Flowers rose-coloured. 4. *C. succirubra*.

Cinchona plantation was started in Khasi Hills at Nongkhlaw as early as 1867, also in Jirang.

This was stocked with *Cinchona succirubra* Pavon and *micrantha* Ruiz et Pavon from Bengal plantation. A supply of seeds of *C. officinalis* Linn. was received from the same source at a later date. The plantation remained in charge of Mr. Bierman for about 3½ years. As the Bengal plantations were promising it was not considered worth while to extend the Khasi Hills plantation.

There were in all 13 plots of plantations, in the areas quoted above, Jirang being the highest elevation.

Samples of barks of *C. succirubra*, *C. officinalis* and *C. micrantha*, from the different plantations were sent to Govt. Quinologist in Darjeeling and best results were obtained from *C. succirubra*, which also thrived well on these hills.

“The Cinchona trees of Jirang approached the natural term of their existence (18 years old) in comparison with the other two areas. They served the purpose for which they were planted *i.e.*, to ascertain if Cinchona will grow in the Khasi Hills, which they will.”

The plantations have been abandoned. The following species are now being experimented on in the Khasi Hills (Umsaw), Garo Hills (Tura Peak) and Mikir Hills—*C. Ledgeriana*, *C. succirubra*, and *C. Ledgeriana* × *C. succirubra*. The last two centres have since been closed.

1. *Cinchona officinalis* Linn.

Leaves 3-6 by 1-2·5 in., ovate-lanceolate, lanceolate or elliptic-lanceolate, acute or acuminate; glabrous above with

hairy pits at the axils of the nerves; lateral nerves 6-10 on either half; base attenuate or acute; petiole $\cdot 6\text{--}1\cdot 4$ in. long. *Flowers* red in corymbiform cymes, terminal or axillary. *Corolla-tube* $\cdot 5\text{--}\cdot 7$ in. long, densely silky. *Capsule* ovoid-oblong, about $\cdot 6$ in. long.

Was cultivated in KHASI HILLS (Nongkhlaw).
Quinine contents of bark 1.75-10.6%.

2. *Cinchona Calisaya Weddell.*

Leaves 3-6 by $1\cdot 5\text{--}2$ in., oblong-lanceolate, elliptic-lanceolate or obovate-lanceolate, obtuse or acute, coriaceous, glabrous; lateral nerves 6-9 on either half, slender, axillary, pits rather inconspicuous; base acute or cuneate; petiole $\cdot 4\text{--}\cdot 9$ in. long. *Flowers* pale flesh coloured in cymes, arranged in terminal pyramidal panicles, sometimes also axillary. *Corolla* $\cdot 3\text{--}\cdot 6$ in. long; lobes with a white fringe of hairs. *Capsule* $\cdot 3\text{--}\cdot 6$ in. long, ovoid-oblong.

Was cultivated in Khasi Hills (Nongkhlaw).
Quinine contents of bark 4%.

3. *Cinchona Ledgeriana Moens.*

A small tree. *Leaves* 3-6 by 1-2 in., elliptic-oblong or elliptic-lanceolate, obtuse or acute, coriaceous, glabrous; lateral nerves 5-8 on either half (without axillary pits); petiole $\cdot 4\text{--}1$ in. long. *Flowers* strongly scented, yellowish, in large terminal, few flowered cymes arranged in pyramidal panicles (often running down to the 2nd pair of leaves); pedicels $\cdot 16$ in. long. *Corolla* $\cdot 3\text{--}\cdot 6$ in. long; tube pentagonal; lobes fringed with long white hairs. *Capsule* $\cdot 3\text{--}\cdot 6$ in. long, elongate, ovoid, crowned with the remains of the calyx.

Cultivated in K. & J. HILLS, GARO HILLS and Mikir Hills (SIBSAGAR).

Quinine contents of bark $\cdot 4\text{--}13\%$.

MIKIR HILLS—			
	Root	Stem	Branch
Quinine Alkaloids	4.4%	3.6%	3.34%

4. *Cinchona succirubra Pavon.*

A large tree. *Leaves* 4-10 by $2\cdot 5\text{--}6$ in., elliptic, suborbicular or broadly ovate, acute, coriaceous, softly tomentose

beneath; lateral nerves 6-10 on either half, prominent (without axillary pits); base cuneate or acute; petiole 1-1·5 in. long. *Flowers* rose-coloured, in cymes arranged in thyrsoid terminal or axillary panicles. *Corolla* 5-7 in. *Capsule* ellipsoid, oblong, elongated, 1-1·4 in. long.

Cultivated in KHASI HILLS, GARO HILLS & SIBSAGAR—Mikir Hills.

Bark contents:—

Quinine 0·82-1·37%

Cinchonidine 3·2-5·13%

A hybrid *C. Ledgeriana* × *C. succirubra* is also being tried now in the province.

11. LUCULIA Sweet.

***Luculia Pinceana* Hook.** Vern. *Soh-khlih*, *Dieng-symphiakhli*, *Dieng-tew-khohir*, *Dieng-doh-khlee*, *Dieng-pan-siang-khlih*, *Snam-mau-synrang*, Khasi.

A tall erect shrub; stem ash-coloured, wood cream-coloured, old leaves scarlet or turning greenish red. *Leaves* 2-6 by 1·8-2·5 in., entire, elliptic, acuminate, coriaceous, usually pubescent on the nerves beneath; lateral nerves 11-16, on either half, ascending, subparallel; base narrowed into the petiole (1·25-1·7 in. long). *Flowers* large, pinkish, fragrant, glabrous, pedicelled, in terminal or axillary, branched corymbose cymes. *Calyx-segments* spatulate, greenish; margin and base inside tipped reddish brown with a distinct midrib. *Corolla* hypocrateriform; tube about 1·75 in. long; lobes imbricate in bud with interposed tubercles at the sinuses, which appear like a corona, adnate to the corolla and only partly, free at the sinuses. *Stamens* 5; filaments filiform, subadnate to the corolla tube; anthers linear-oblong, adnate to the filament. *Ovary* 2-celled; style slender, shorter than the corolla tube; stigma 2, linear, recurved at the tips. *Capsule* 1·5-1 in. long, obovoid, usually with ribbed valves. *Seeds* many, minute; testa wrinkled, winged at either ends.

Common specially towards the eastern part of KHASI HILLS, on limestone formation. Mishmi Hills.

Flrs. 9-11. Fr. 4, but persists long afterwards.

12. WENDLANDIA Bartl.

Shrubs or small trees. *Leaves* opposite or ternate; stipules often persistent, entire or 2-fid. *Flowers* small, rosy or white in dense axillary or terminal paniced cyme, 2-3 bracteolate. *Calyx* tube globose with 4-5 subequal pubescent lobes. *Corolla* hypocrateriform or funnel-shaped, 4-5 lobed, imbricate in bud. *Stamens* 4-5, between the corolla lobes adnate to the tube; anthers exserted, versatile. *Ovary* usually 2-celled, rarely 3-celled; ovules many on globose axile placentas; style filiform; stigma entire, bifid or two partite. *Capsule* small, globose, 2 valved, many seeded. *Seeds* minute, compressed, obscurely winged; embryo short, albumen fleshy.

Leaves opposite :—

Corolla tube short less than twice the length of lobes :—

Capsule .1 in. long :—

Corolla lobes equalling tube or slightly longer. Leaves 4-9 in. long; lateral nerves up to 20. ..

1. *W. exserta.*

Corolla lobes shorter than the tube. Leaves 3-7 in. long; lateral nerves up to 12.

2. *W. puberula.*

Capsule .06 in. long :—

Corolla lobes recurved a little shorter than the tube. Leaves 3-7; lateral nerves up to 10. ..

3. *W. Wallichii.*

Corolla tube twice the length of lobes or longer :—

Calyx hairy :—

Corolla lobes shorter than the tube. Leaves glabrous above (mature), glabrate beneath.

4. *W. tinctoria.*

Corolla lobes half the length of the tube or less. Leaves scaberulous above and harshly pubescent beneath.

5. *W. paniculata.*

Calyx glabrous :—

Calyx teeth minute. ..

6. *W. glabrata.*

Calyx teeth nearly as long as the tube.

7. *W. coriacea.*

Calyx teeth longer than the tube. ..

8. *W. ligustrina.*

Leaves usually in whorl of 3 :—

Calyx glabrous, teeth as long as tube; stigma clavate; style far exserted. ..

9. *W. pendula.*

(I have followed Brandis. Dr. Cowan has recently dealt with the genus *Wendlandia* in details in the "Notes from the Royal Botanic Garden, Edinburgh, number LXXX, Vol. XVI, October, 1932").

1. *Wendlandia exserta* DC. Vern. *Kadam*, Ass.

A small evergreen tree with rough brown bark, cracking longitudinally, and exfoliating in long strips. *Branchlets*, leaves and inflorescence grey pubescent or hoary. *Leaves* 4-9 by 1-3.5 in., entire, ovate, lanceolate or narrow oblong, acuminate, coriaceous, glabrate or pubescent above, softly tomentose beneath; lateral nerves 12-20 on either half, subparallel; petiole .5-1 in. long; stipules ovate, recurved. *Flowers* white, sessile, .15 in. across, fragrant in pyramidal panicles of cymes up to 10 in. long. *Calyx* grey tomentose; segments subulate. *Corolla* funnel-shaped, broad, recurved; lobes reflexed. *Stamens* alternating with the lobes; filaments equalling the anthers, which are exserted. *Style* bifid. *Capsule* hoary, pubescent, .1 in. long, crowned by the erect lanceolate hairy calyx-segments.

Jokai Reserve, LAKHIMPUR; Apha River, SYLHET, (Kanjilal).

Flrs. 4-5. Fr. rainy season.

2. *Wendlandia puberula* DC. Vern. *Karakholi*, *Kadam*, Ass.; *Papka-changne*, Duff.; *Snam-maie*, Khasi; *Rismini*, Mech; *Theng-merok*, Mik.; *Mau-thok-rai-phang*, Kach.

A small tree. *Bark* brown-grey, soft, corky, closely and somewhat spirally fissured; blaze copper brown changing very dark brown, fibrous; innovation puberulous. *Leaves* 3-7 by 1-3 in., elliptic or oblong, acute, acuminate, rather membranous, glabrous above, except along the nerves, with brown pubescence along the midrib and nerves beneath; lateral nerves 9-12 on either half; petiole .3-.7 in. long; stipules .3-.8 in. long, usually caudate acuminate, persistent. *Flowers* sessile, very small, bluish white. *Calyx* hairy; segments triangular. *Corolla* funnel-shaped; lobes shorter than the tube. *Filaments* as long as the anthers; anthers linear. *Style* bifid. *Capsule* about .1 in. long, nearly glabrous.

NOWGONG, DARRANG, GOALPARA, SIBSAGAR, N. C. HILLS, KHASI HILLS—ascending up to 4,000 ft.

Flrs. 2-4. Fr. 5-7.

3. *Wendlandia Wallichii* W. & A. Vern. *Dieng-sa-lakba-basow*, *Dieng-sha-mot*, Synt.; *Dieng-sai-moit*, *Dieng-ja-sau*, *Dieng-cha-kaba*, Khasi.

A shrub or a small tree often branched from near the ground (or rather growing in a clump). *Bark* cinnamon brown, corky, split lines vertical, about $\cdot 15\text{--}\cdot 25$ in. apart, soft inside, light creamy-dun brown, astringent; young leaves reddish-brown, yellow when old. *Leaves* 3-7 by 1-2 \cdot 5 in., opposite, sometimes ternate, glabrescent, almost coriaceous, entire, elliptic or elliptic-lanceolate; lateral nerves 8-10 on either side; prominent beneath, with a distinct midrib: base cuneate; petiole $\cdot 2\text{--}\cdot 8$ in. long; stipules caducous, brown, ovate, acute. *Flowers* white, slightly scented; pedicels hairy; panicles pubescent. *Calyx* glabrous or 'obsoletely puberulous, lanceolate, teeth small, acute, broadly deltoid. *Corolla* white, tubular, tube about 3 times longer than the calyx; lobes ovate, spreading or slightly recurved. *Anthers* resting on the mouth of the corolla tube. *Fruit* globose, about $\cdot 06$ in. diam.

N. E. F. TRACT, SIBSAGAR, LIKHIMPUR, and KHASI HILLS, ascending up to 6,000 ft.

Flrs. 9-11. Fr. 12-2.

4. *Wendlandia tinctoria* DC. Vern. *Thengmerok*, Mik.; *Gauni-kesta*. *Rangapatiogach*, Ass.; *Dieng-ja-kybu*. *Dieng-joba*, *Dieng-khon-suet*, Khasi; *Dieng-sha-mot*, *Dieng-sha-lak-ba-khlow*, *Dieng-ja-lakba*, Synt.; *Borganchi*, *Bolnabat*, Garo.

A shrub or small tree; branches straggling or spreading. *Bark* smooth, brown to ash-coloured; corky and fibrous. *Leaves* 3-8 by 1-3 in., very strongly nerved, oblong, oblong-lanceolate or obovate, acuminate, glabrous above when mature, glabrate beneath; lateral nerves 10-12 on either half; base narrowed into the petiole, $\cdot 2\text{--}\cdot 8$ in.; stipules ovate, keeled, cuspidate. *Flowers* sessile, white in pubescent, pyramidal panicles; bracts subulate. *Calyx* teeth oblong-ovate, hairy, persistent in fruit. *Corolla* slender; lobes shorter than the tube. *Filaments* short. *Stigma* oblong. *Capsule*

rounded, about .07 in. across, hairy, reddish-brown when ripe.

KAMRUP, SIBSAGAR, NOWGONG, N. C. HILLS, GARO HILLS and KHASI HILLS, ascending up to 3,000 ft.

The bark is used as a mortant in dyeing.

Flrs. 2-3. Fr. 4-5.

5. *Wendlandia paniculata* DC. Vern. *Dieng-sha-mot*, *Dieng-sa-lakba*, *Dieng-ja-lakba*, Synt.

A small tree with spreading crown. *Bark* dark brown, deeply and closely furrowed inside, very light, dun-brown, fibrous. *Leaves* rough, 2-6 by 1-3 in., entire, elliptic or oblanceolate, scaberulous above, harshly pubescent beneath, specially on the nerves; acute at both ends; lateral nerves 8-11 on either half; petiole .3-.8 in. long; stipules recurved, broad, orbicular, oblong or reniform, coriaceous, pubescent. *Flowers* sessile, white or greenish-white, in large villous spreading panicles. *Calyx* hairy, supported by one or two linear bracts; teeth rounded, shorter than the tube. *Corolla* funnel-shaped; lobes half the length of tube or less.

K. & J. HILLS—ascending up to 5,000 ft.

Flrs. Hot season. Fr. Cold season.

6. *Wendlandia glabrata* DC.

A small evergreen tree; young parts specially branches of inflorescence, minutely grey canescent, otherwise quite glabrous. *Leaves* 4-6 by 1.5-2.3 in., elliptic-lanceolate, subcoriaceous, finely acuminate, dark green and glabrous above, reddish-brown underneath; lateral nerves 6-8 on either half, arched, prominent beneath, sometimes with tufts of hair in the axils; petiole .5-1 in., narrowly margined; stipules twice as broad as long, shortly cuspidate. *Flowers* yellowish, subsessile, about .15 in. long, in terminal pyramidal, panicles 6-10 in. long. *Calyx* glabrous; teeth minute, triangular. *Corolla* tube cylindrical or trumpet-shaped; limb reflexed. *Capsules* globose, 2-valved, about .06 in. across. *Seeds* minute.

NAGA HILLS, LUSHAI HILLS and MANIPUR—ascending up to 6,000 ft.

Flrs. 3-4. Fr. 5-6.

7. *Wendlandia coriacea* DC. Vern. *Kala tilka*, Nep.

An evergreen small tree or shrub. *Bark* brown. *Leaves* 3-6 by $\cdot 8\text{--}1\cdot 5$ in., entire, lanceolate, acuminate, coriaceous, shining above; lateral nerves 9-12 on either half, slender; base narrowed into the petiole; petiole $\cdot 2\text{--}6$ in. long; stipules erect, pointed. *Flowers* sessile, in densely flowered pyramidal panicle. *Calyx* glabrous; teeth nearly as long as the tube. *Corolla* tube slender; lobes oblong; stigma short.

DARRANG (opposite Rajakata).

Flrs. 1.

8. *Wendlandia ligustrina* Wall. Vern. *Theng-merok*, Mik.; *Man-thok-rai-phang*, Kach.

A much branched small tree. *Bark* greenish, with vertical split, $\cdot 25$ in. thick; inside white, turning brown, fibrous; old leaves red. *Leaves* 3-5 by $1\cdot 2\text{--}2$ in., entire, obovate, lanceolate to elliptically lanceolate, acute, almost coriaceous, glabrous or puberulous on the nerves beneath; lateral nerves 7-8 on either half, sub-parallel; petiole $\cdot 2\text{--}7$ in. long; stipules adpressed, cuspidate. *Flowers* small, sessile, in lax pubescent panicle. *Calyx* glabrous; teeth filiform, longer than the tube. *Corolla* glabrous; lobes oblong, shorter than the tube. *Stamens* and styles exserted.

N. C. HILLS, KHASI HILLS.

Flrs. 1.

9. *Wendlandia pendula* DC.

An elegant somewhat straggling shrub, with slender pendulous branches; branchlets glabrous. *Leaves* usually in whorls of 3, almost sessile, (occasionally opposite) 3-4 by 1-2 in., ovate or ovate-lanceolate, obtusely acuminate, shining, pubescent on the nerves beneath; lateral nerves 6-7 on either half; base rounded or sub-acute; stipules small, triangular. *Flowers* clustered, in stout panicles 4-6-5 in. long. *Calyx* glabrous; teeth lanceolate, as long as the tube. *Corolla* tube $\cdot 16\text{--}2$ in. long; lobes oblong. *Stamens* shortly exserted. *Style* far exserted up to nearly twice as long as the corolla tube; stigma clavate.

MANIPUR. (Brandis).

Wendlandia grandis Cowan. *W. tinctoria* DC. Var. *grandis* Hk. f. Vern. *Bol-Borak*, Garo.

A tree 45'/35''; young branches brownish. *Leaves* 7·3 by 4·1 in., ovate or elliptic-ovate, abruptly short-acuminate, coriaceous; base cuneate; petiole glabrous, 1·4 in. long; stipules interpetiolar, triangular. *Flowers* fragrant, in fascicles, sessile. *Calyx* densely pubescent; segments obtuse—triangular. *Corolla* tube about ·2 in. long, pilose inside; lobe ovate. *Anthers* ovate; filaments short. *Style* bifid, somewhat exserted.

Throughout the Province upto 4,000 ft. Kanjilal's No. 5175.

Flrs. 1-3. Fr. 4-5.

Wendlandia scabra Kurz.

Journal Asiatic Soc. Bengal XII (1872), p. 310 For. Flor. British Burma II (1877), p. 73.

W. paniculata Hk. f. F. B. I. III, p. 38 *proparte non*. DC.

W. paniculata Hook F. I. C. *proparte vix*. DC., Brandis Indian trees (1906), p. 374 *proparte*.

W. paniculata DC. sub sp. Cowan in Craib. Fl. Siam Enum. II pt. 1 (1932), 22.

SYLHET, CACHAR, MANIPUR upto 4,000 ft.

(*The Genus Wendlandia* by Dr. J. M. Cowan, in notes R. B. G. Edin. No. LXXX, October, 1932.)

Argostemma verticillatum Wall.

A small delicate herb. *Leaves* 3-4 by ·4-·8 in., in a whorl of 4. sessile, lanceolate, acuminate, glabrous, unequal-sided; base sometimes oblique. *Flowers* ·3 in. across, in umbels. *Corolla* valvate, ·15 in. across; tube ·4 in. long. *Calyx-teeth* acute. *Anthers* 5, free, apiculate, opening by pairs. *Capsule* 2-celled; seeds minute.

KHASI HILLS—Umsaw (Upto 4,000 ft.).

Flrs. 9. Fr. Cold season.

The following species of *Argostemma* (Leaves entire, membranous; stipules entire; corolla rotate; anther large; stigma capitellate; capsule 2-celled) occur in the region of the "Flora." They are small delicate herbs. It is not considered necessary to describe them in detail.

A. sarmentosum Wall, *A. khasianum* C. B. Clarke, *A. pumilum* Benn., *A. rostratum* Wall, *A. humile* Wall, and *A. fragile* Geddes.

13. HEDYOTIS Linn.

Shrubs, undershrubs or herbs, sometimes climbing. *Leaves* usually opposite, occasionally ternate; stipules conspicuous, furnished with bristles, sometimes connate.

Flowers tetramerous, white or lilac, in axillary or terminal lax, or compact capitate cymes. *Calyx* turbinate or ovoid; segments 4, acute, persistent. *Corolla* campanulate or funnel-shaped; lobes valvate in bud. *Stamens* 4, inserted on the tube or throat; filaments short. *Ovary* 2-celled; style filiform; stigma bifid or 2 lobed; ovules numerous on sessile or stalked axile placentas. *Fruit* a small coriaceous or crustaceous septicidal or loculicidal capsule or sometimes of 2 separate or connate cocci or quite indehiscent. *Seeds* plano-convex or angled; albumen horny; embryo clavate.

Climbing shrub; flowers white in compact compound subcorymbose cymes.

1. *H. scandens*.

Erect stout under-shrub; flowers bluish in globose bracteate heads.

2. *H. uncinella*.

1. *Hedyotis scandens* Roxb. Vern. *Bhedeli lot*, Ass., *Bonhrathrin*, Lush.; *Samreting*, *Mikrisim*, Garo; *Jermiskie*, *Meidi*, Khasi; *Tyllie-iamu-sem*, Synt.

A slender woody climbing shrub with glabrous green branches; young twigs minutely puberulous, somewhat herbaceous, older twigs glabrous. *Leaves* opposite, 2.75-4.25 by .65-1.5 in., narrow, oblong or elliptic lanceolate, gradually sometimes abruptly caudate, less often obtuse, acuminate, undulate, subcoriaceous, rather thick, glabrous and minutely punctate on both surfaces, paler beneath; lateral nerves somewhat obscure, about 5-6 on either half, arcuately ascending and meeting the upper pair; tertiaries fine, often sub-parallel; base narrowed to a margined and channelled petiole, lower portion of petiole adnate to a membranous intrapetiolar stipular sheath which has a horizontal ridge near the top; two prominent cusps about .1 in. long, decurrent up to the ridge and is sometimes purple spotted, free end of sheath sparsely ciliate or erose. *Flowers* white, turning cream, .2-.25 in. long, in axillary and terminal compact compound triochotomous subcorymbose puberulous cymes up to 1.5 in. long and about 2 in. across; peduncle .6-.8 in. long; pedicels .1-.15 in. long; bracts and bracteoles deciduous. *Calyx* tube dilated towards the apex; teeth 4, .06 in. long, oblong, space between the teeth sometimes minutely setose. *Corolla* valvate in bud, 4 lobed;

tube short; throat slightly ventricose and hairy; lobes oblong, reflexed, lower portion shaggy within. *Stamens* 4, alternating with the corolla lobes, included except for the tips of anthers; filaments minute-villose; anthers 2-celled, introrse. *Ovary* 2-lobed, 2-celled, top free from the calyx-tube; style glabrous at the base, thicker and pubescent above, the two parts faintly articulated; stigma shortly 2-lobed, exserted; ovules in each cell numerous on a peltate placenta from the dissepiment. *Fruit* capsular, globose, about .15 in. long, seated on the persistent calyx, apex extended between the calyx-teeth, dehiscing at the top and ultimately separating into 2 cocci; seeds minute, many, planoconvex, with an irregular rim.

All over the province, ascending to 5,000 ft.

Used medicinally for eye diseases and after birth troubles. The roots are used with certain other medicines for sprains.

Flrs. mostly 10-1, according to locality and also at other times of the year. Fruits mostly cold season.

2. *Hedyotis uncinella* Hk. & Arn. Vern. *Sher-rit-arong*, Khasi.

An erect stout undershrub with perennial roots, stem glabrous, conspicuously 4-angled and ribbed, internodes long. *Leaves* .8-3.5 by .4-1.7 in., sessile, entire, ovate or ovate-lanceolate, acuminate, slightly pubescent above; nerves distinct, sub-basal; base acute or rounded; petiole 0.1 in. long; stipules small, glandular, sessile or stalked, pubescent. *Flowers* bluish in globose terminal or axillary bracteate heads. *Calyx* glabrous or ciliate; teeth recurved. *Corolla* tube short, glabrous; lobes linear. *Capsule* broadly ovoid.

KHASI HILLS, common.

Flrs. 7-9. Fr. Cold weather.

H. vestita Br.

A diffuse herb; branches terete; all parts villous. *Leaves* 2-3.5 in. long, lanceolate or narrow-lanceolate, acuminate; nerves prominent beneath, 5-7 on either half. *Cymes* small, axillary, shortly peduncled. *Capsule* minute.

CACHAR, KHASI and JAINTIA Hills, Aka hills (15128).

H. tenelliflora Bl.

A glabrous diffuse undershrub; branches quadrangular. *Leaves* sessile. 1-1.5 by .15 in., linear-lanceolate, acuminate; margin revolute,

1-nerved; stipular cilia long. *Flowers* in few flowered clusters or solitary. *Calyx-teeth* rigid, ciliate. *Capsule* ovoid, glabrous.

KHASI HILLS, (upto 4,000 ft.).

Flrs. & Fr. Rainy season.

H. hispida Retz. modern name *H. verticillata* (L) Lamk.

A diffuse herb rather shrubby; branches scabrid. *Leaves* margin recurved; base acute; stipular cilia long. *Flowers* in axillary clusters. *Calyx* teeth triangular. *Capsule* ovoid, hispid.

GOALPARA (Kachugaon), CACHAR, KHASI HILLS, UPPER ASSAM.

Flrs. & Fr. Cold season.

H. fulva Hook. f., is also recorded from Khasi Hills.

Oldenlandia nudicaulis Roth.

An erect annual, somewhat hairy. *Leaves* 1-1.5 by .5-.7 in., ovate, membranous. *Flowers* in long-penduncled terminal lax cymes; branches capillary. *Calyx-teeth* minute and subulate. *Capsule* hemispheric.

KHASI HILLS (upto 5,000 ft.), UPPER ASSAM.

Fr. 10.

O. Heynii Br. **O. diffusa** Roxb. and **O. paniculata** Linn. also occur in the region of the "Flora."

14. ANOTIS DC.

Herbs, rarely undershrub, ascending or prostrate, rarely erect, sometimes with flaccid hairs; stipules scarious or bristly. *Flowers* small, in axillary and terminal cymes or heads. *Calyx-tube* short; segments 4, erect or recurved, with usually broad sinuses. *Corolla* tubular or funnel-shaped; lobes 4, usually shorter than the tube, valvate. *Stamens* 4, adnate to mouth of corolla; anthers linear, oblong, included or exserted. *Ovary* 2- rarely 3-4 celled; style filiform; stigmas 2-4, linear; ovules usually few on placentas arising from near the base of the septum. *Capsule* didymous or laterally compressed, usually loculicidal (rarely indehiscent). *Seeds* peltate, boat-shaped or plano-convex; testa coarsely pitted; embryo clavate; albumen horny.

Perennials :—

Fruit turgid, dehiscing loculicidally :—

Leaves linear-lanceolate up to 4 in.

long. Calyx-teeth short. 1. *A. oxyphylla*.

Leaves ovate-lanceolate up to 2 in.

long. Calyx-teeth large. 2. *A. ingrata*.

Fruit compressed, indehiscent :—

Leaves .3-1 in. long, sessile or sub-
sessile, ovate. 3. *A. Wightiana*.

1. *Anotis oxyphylla* Wall.

An erect small undershrub, sometimes gregarious; stem stout, often rooting at the lower nodes, glabrous. *Leaves* 1.5-4 by .2-.5 in., entire, linear-lanceolate, acuminate; coriaceous; lateral nerves 3 on either half, obscure; base narrowed into the petiole; petiole .1-.2 in. long; stipules linear-lanceolate, sometimes laciniate. *Flowers* white with a light shade of pale purple in much divided pedunculate terminal subcorymbose cymes. *Calyx* teeth short. *Corolla* much larger than the calyx-tube. *Capsules* pedicelled, hemispheric; cells 5-8 seeded.

KHASI HILLS up to 6,000 ft.

Flrs. 9-10. Fr. Cold season.

2. *Anotis ingrata* Wall.

A straggling fœtid undershrub or perennial herb with stout branches, 2-3 ft. high, hairy at the nodes. *Leaves* 1.5-2 by .5-.6 in., ovate-lanceolate, obscurely crenate, acuminate, membranous, puberulous, specially on the nerves; lateral nerves 6-9 on either half, very slender; base cuneate; petiole .1-.3 in. long; stipules bristly. *Flowers* white, shortly pedicelled, in terminal lax cymes. *Calyx-teeth* large. *Corolla-tube* .16 in. long; lobes oblong. *Capsule* didymous, hemispheric; cells many seeded.

KHASI HILLS, ascending up to 6,000 ft.

Flrs. 8-9. Fr. Cold season.

3. *Anotis Wightiana* Hk. f.

A diffuse perennial herb. *Leaves* .3-1 by .2-.5 in., sessile or sub-sessile, ovate, entire, acute, pubescent; lateral nerves obscure; base rounded or acute. *Flowers* white, blue or purplish, shortly pedicelled, in small terminal 2-leaved involucrate capitate cymes arranged on short axillary branchlets. *Fruit* orbicular, compressed, 2-4 celled, indehiscent; cells 1-2 seeded; seeds rugose when dry.

KHASI HILLS.

Flrs. 9. Fr. Cold season.

Anotis gracilis Hk. f. and *A. urophylla* Wall are also recorded from KHASI HILLS. (F. B. I., pp. 71 and 72, vol. III).

Flrs. 8. Fr. later.

15. POLYURA Hk. f.

Polyura geminata Hk. f.

An undershrub (annual?) with rooting stem. *Leaves* 1.5 by .5-1.7 in., entire, opposite or whorled, elliptic to elliptic-lanceolate, obtuse or bluntly acuminate, membranous, glabrate above, pale beneath; lateral nerves 10-14 on either half, usually reddish-brown when dry, subparallel, arcuate; tertiary nerves zigzag; base narrowed into the petiole, which is often marginate (.2-.6 in. long); stipules filiform. *Flowers* pentamerous, white, crowded in long pedunculate axillary scorpioid cymes. *Calyx* lobes persistent. *Corolla* funnel-shaped; throat densely hairy; lobes valvate in bud. *Stamens* in the middle of the tube; filaments subulate; anthers bifid. *Ovary* 2-celled; style slender, puberulous; stigmas 2; ovules many. *Capsule* small, subglobose, many seeded, septicidal; embryo minute; albumen fleshy.

KHASI HILLS, ascending up to 4,000 ft.

Flrs. 7-10. Fr. Cold season.

Spiradiclis bifida Blume.

A herbaceous plant, rather woody below, glabrous. *Leaves* 3-6 by 1-2 in., elliptic, elliptic-lanceolate or elliptic-ovate, acuminate. *Flowers* small, almost sessile along one side of the branches of a dichotomous terminal paniced cyme; panicels 4-8 in. long. *Calyx* segments 5. *Corolla* lobes 5. *Stamens* 5. *Ovary* 2-celled. *Stigma* lobed. *Capsule* small, sub-globose.

CACHAR, UPPER ASSAM, Aka Hills and KHASI and JAINTIA HILLS, up to 4,000 ft.

Flrs. 7-8. Fr. 8-9.

S. cylindrica Wall. KHASI HILLS, MISHMI HILLS.

16. OPHIORRHIZA Linn.

Ophiorrhiza ochroleuca Hk. f.

A small shrub, glabrous. *Leaves* 3-7 by 1·5-3 in., elliptic or elliptic-lanceolate, long acuminate, glabrous; lateral nerves 10-15 on either half; base narrowed into the petiole or acute; petiole ·5-·1 in. long; stipules 2-fid, lanceolate, caducous. *Flowers* secund on the branches of axillary or terminal dichotomous pubescent cymes; peduncles and branches stout; bracts 0 or obscure and caducous. *Calyx* teeth very short. *Corolla* tubular, cylindric, ·3-·5 in. long, 5-lobed; lobes short, recurved, pubescent within but not winged at the back. *Stamens* 5, inserted on the tube; anthers linear. *Disc* large, 2-lobed. *Ovary* 2-celled; style filiform; ovules many on basal ascending placenta. *Capsule* coriaceous, compressed, glabrous, pedicelled, ·3 in. across. *Seeds* many, minute, angled; embryo clavate; albumen fleshy.

CACHAR, SIBSAGAR. KHASI HILLS (ascending up to 4,000 ft.).

Flrs. 3-7. Fr. 8-9.

Ophiorrhiza Harrisiana Heyne.

A low soft herbaceous plant, pubescent or tomentose. *Leaves* elliptic or elliptic-lanceolate, acute or acuminate, pubescent on the nerves underneath. *Flowers* pink in terminal cymes, usually tomentose; bracteoles short, deciduous. *Calyx-teeth* subulate. *Capsule* usually glabrous.

KHASI and JAINTIA HILLS, 5,000 ft.

Flrs. 5.

Ophiorrhiza hispida Hook. f.

A herbaceous plant, woody below, almost gregarious in Lakhimpur Dipterocarp forests; young plants hispid. *Leaves* 1-3 in., acuminate, puberulous; stipules large. *Flowers* in densely flowered terminal subglobose cymes; peduncles short, hispid; bracteoles linear, ciliate. *Corolla lobes* hispid. *Capsule* hispid.

KHASI and JAINTIA HILLS, 4,000 ft. LAKHIMPUR.

Flrs. 8.

Ophiorrhiza Mungos Linn., *O. rosea* Hk. f., *O. Wallichii* Hk. f., *O. oppositiflora* Hk. f., *O. Griffithii* Hk. f., *O. Treutleri* Hk. f., *O. fasciculata* Don., *O. hispida* Hook. f., *O. subcapitata*

Wall., *O. calcarata* Hook f., *O. nutans* C. B. Clarke, and *O. pauciflora* Hook. f. are also recorded from the region of the flora, specially from Khasi Hills.

(*F. B. I.* Volume III, Pp. 77-84).

17. SILVIANTHUS Hk. f.

Silvianthus bracteatus Hk. f.

A glabrous shrub; young parts often scabrid with short rusty hairs. *Leaves* 4-8 by 2-5 in., elliptic-obovate or lanceolate, irregularly toothed, sharply acuminate, membranous, glabrous; main lateral nerves 10-12 on either half, slender, much arched; petiole .7-1.7 in., occasionally 3 in.; stipules membranous. *Flowers* .5-.8 in. long, in axillary and terminal bracteate cymes. *Calyx* purplish green, accrescent; segments 5, rarely 4. *Corolla* white, funnel-shaped, tube hairy within; lobes 5, short, reflexed, induplicate, valvate, sinuses plaited. *Disc* large. *Stamens* 2, on the corolla-tube; filaments short; anthers linear-oblong. *Ovary* 2-celled; style long; stigma spindle-shaped. *Capsule* globose, up to .3 in. across, crowned with the accrescent calyx. *Seeds* black, obliquely truncate at the upper extremity.

SYLHET; CACHAR; Nongpoh, Jowai (K. HILLS); Nichuguard, NAGA HILLS; MANIPUR.

Flrs. 4-5. Fr. 9-10.

18. MUSSÆNDA Linn.

Shrub or undershrub, rarely herbs, erect or climbing, sometimes scandent, frequently very conspicuous by one of the calyx segments of some of the outer flowers developed into a large long petioled white or coloured leaf. *Leaves* opposite or ternately whorled; stipules free or connate, sometimes caducous. *Flowers* pentamerous, usually yellow, infrequently white or scarlet, in terminal cymes, rarely solitary. *Bracts* and bracteoles deciduous. *Calyx-tube* oblong or turbinate; segments usually deciduous. *Corolla* usually silky outside, tubular below, funnel-shaped above; throat villous; lobes valvate, with curled margins in bud. *Stamens* adnate to the throat or tube; filaments short; anthers linear. *Ovary* 2-celled; ovules many on peltate fleshy

placenta; style filiform; stigmas 2, linear. *Berry* fleshy, crown areolate. *Seeds* many, minute; testa pitted; embryo minute; albumen fleshy.

Calyx-teeth deciduous :—

- | | |
|--|----------------------------|
| Berry globose, glabrous; lateral nerves 5-6 pairs. | 1. <i>M. glabra</i> . |
| Berry usually obovoid with few scattered specks (not hairy); lateral nerves 6-8 pairs. | 2. <i>M. frondosa</i> . |
| Berry globose, laxly hairy; lateral nerves 7-10 pairs. | 3. <i>M. macrophylla</i> . |

Calyx-teeth persistent :—

- | | |
|---|---------------------------|
| Leaves glabrous. Berry white, succulent. | 4. <i>M. keenani</i> . |
| Leaves villous. Berry areolate and with adpressed hairs. | 5. <i>M. incana</i> . |
| Leaves strigose on the midrib beneath, sparsely setulose above. Berry areolate above with setaceous calyx segments. . . | 6. <i>M. Roxburghii</i> . |
| Leaves tomentose when young, brownish pubescent on the nerves above. Berry black when dry .3 in. long, very fine pubescent. | 7. <i>M. Parryorum</i> . |
| Leaves pilose. Berry .3-.4 in. long, green when dry, smooth. | 8. <i>M. Pentasemii</i> . |

1. *Mussænda glabra* Vahl. Vern. *Taksap-riube*, Miri; *Charbu-taru*, Duff.; *Khem-banju-doukha*, Khimbandai, Longderikang, Syntew-jah-rong-tham, Khasi; *Charai-atha*, Chubathath, Sonarupa, Ass.; *Wati-puon-phoi*, Kuki.

A large scandent often climbing shrub; bark brown, lenticellate. *Leaves* 2.5-3.5 by .5-1.6 in., elliptic or oblong-lanceolate, acuminate, coriaceous, glabrous or puberulous on nerves, glossy green; lateral nerves 5-6 on either half; petiole .2-.5 in. long. *Flowers* in rather dense terminal puberulous cymes. *Calyx* campanulate; teeth subulate, shorter than ovary, deciduous; petaloid segment 2.5 by 1.5-2 in., white, often tinged with green, strongly nerved, on stalk 1-1.5 in. long. *Corolla* pubescent, .6-.8 in. long; lobes as long as broad. *Berry* .5 in. long, globose, glabrous.

N. E. F. TRACT, LUSHAI HILLS, N. C. HILLS, SIBSAGAR, CACHAR, MANIPUR, KHASI HILLS, LAKHIMPUR, GOALPARA, ascending up to 4,000 ft.

Flrs. 3-5. Fr. 6-12.

2. *Mussænda frondosa* Linn.

A scandent shrub. *Leaves* 2·6·5 by ·8·2·8 in., entire, ovate, elliptic-oblong, acuminate, glabrate above, pubescent beneath; lateral nerves 6-8 on either half, tertiary nerves reticulate, often inconspicuous; base acute, often cuneate; petiole ·2·1 in. long; stipules ·2··25 in., 2-fid. *Flowers* orange-coloured. *Inflorescence* dense and pubescent. *Calyx* deciduous; segments lanceolate twice the length of ovary or even longer. *Corolla* pubescent; tube about 1 in. long. *Berry* obovoid with few scattered specks (not hairy).

KHASI HILLS.

Flrs. 7-8. Fr. Cold season.

3. *Mussænda macrophylla* Wall. Vern. *Dieng-sa-lynthiah*, Synt.; *Dieng-tnow-tham*, (=Crab's claws), Khasi.

A large erect shrub with staggling branches, all parts more or less hirsute or villous; stem greyish. *Leaves* 2·6·5 by ·8·2·8 in., entire, elliptic or broadly elliptic, cuspidate, membranous; lateral nerves 7-10 on either half, sub-parallel, arcuate, impressed above, prominent beneath; base suddenly cuneate in the short petiole; petiole ·3·1 in. long; stipules broad, recurved. *Flowers* orange-coloured. *Calyx* segments ·5··7 in., foliaceous, deciduous, nerves parallel. *Corolla* tube hirsute; lobes orbicular, apiculate; throat villous. *Berry* globose, about ·6 in. across, laxly hairy.

SIBSAGAR, KHASI HILLS, ascending up to 4,000 ft.

Flrs. 8-9. Fr. Cold season.

4. *Mussænda Keenani* Hk. f.

An erect robust undershrub, stem white with a thick coating of cork, which splits longitudinally. *Leaves* 4-9 by 2·5 in., entire, obovate or oblanceolate, abruptly acuminate, subcoriaceous, glabrous; lateral nerves 15-18 on either half, sub-parallel, very prominent underneath; secondary nerves more or less sub-parallel; base narrowed into the petiole or cuneate; petiole ·2·1 in. long, stout. *Flowers* in cymes, about 3 in. across, almost capitate. *Calyx* teeth ·5 in. long,

fine, persistent. *Corolla* nearly 1 in. long. *Berry* succulent, white.

Nongkhlaw-KHASI HILLS; CACHAR (Keenan).

Flrs. 9-10. Fr. Cold weather.

5. *Mussænda incana* Wal.

An erect undershrub, densely clothed with adpressed hairs. *Leaves* 2-6 by 1-2·8 in., subsessile, entire, elliptic, ovate or oblong, acuminate, subcoriaceous, villous; lateral nerves 10-12 on either half, sunk above; base rounded or acute; petiole ·05-·12 in. long. *Flowers* golden or chrome yellow, in subsessile corymbose cymes. *Calyx* teeth pubescent; enlarged calyx segments foliaceous, pubescent, cream or pale yellow, sub-basal nerved with elegant reticulate venation. *Corolla* ·75 in. long, slender. *Berry* with adpressed hairs and small areole.

Guma Reserve, GOALPARA.

Flrs. 5.

6. *Mussænda Roxburghii* Hk. f. Vern. *Dieng-ja-long-tham*, *Dieng-ja-lai*, Khasi; *Gardek*, Garo; *Bosolangde*, Mik.; *Naolungkamchal*, Lushai; *Chikribiphang*, Mech.; *Soklati*, Ass.; (?) *Imphat-champring*, Mik.

A large erect shrub; stem light brown. *Leaves* 2·5-8 by 1·3-3 in., elliptic to elliptic-lanceolate, entire, acuminate or caudate, membranous, sparsely setulose above, pale beneath, strigose on the midrib beneath and sparsely so between the nerves; lateral nerves 8-12 on either half; base narrowed; petiole stout, ·2-1 in. long; stipules lanceolate. *Flowers* orange, occasionally yellow, in dense corymbose cymes, about 2 in. across. *Calyx* teeth long, persistent, filiform or subulate; stalk of the petaloid calyx segment becomes more or less enlarged and white. *Corolla* tube pale green, very strigose, 1·25-1·5 in. long; lobes ·3 in., orange inside and pale white outside. *Berry* oblong to ellipsoid, crowded in a head-like mass, areolate above with setaceous calyx segments.

KHASI HILLS, LAKHIMPUR, GARO HILLS, SIBSAGAR, N. C. HILLS, LUSHAI HILLS, GOALPARA, DARRANG.

An infusion of the leaves is used for colouring carrying baskets and for binding the wicker work. Leaves are eaten by Mikirs and Khasis as vegetables.

Flrs. 6-11. Fr. Cold season.

Specimen No. 6102 appears to be a distinct variety. *Leaves* inflorescence and branchlets very hairy. (It is not uncommon--- R. N. De)

Mussænda Treutleri Stapf.

A shrub, branches shortly pubescent. *Leaves* 6-12 by 3-6 in., ovate or elliptic-ovate, entire, acute, sparsely hairy, specially hirsute on the nerves on both sides; lateral nerves 6-8 on either half; base usually shortly cuneate; petiole .6-1.5 in. long; stipules often 2-fid, .3-.5 in. long, herbaceous. *Corymbs* many fld. dense, terminal, often with additional cymes on the upper axils; lower bracts broad, sometimes slightly lacinate; upper bracts calycine. *Calyx-teeth* linear or subulate, much and gradually narrowed, herbaceous, almost glabrous, .3-.4 in. long, foliaceous; enlarged segment white. *Corolla* orange, .7-1.25 in. long before opening, adpressed pubescent, almost glabrous on maturity, 5-cornered in bud; lobes .25 in. long, tips cordate, throat hairy. *Berry* globose, dry, .3 in. across, soon glabrescent.

KHASI HILLS (2,000-6,000 ft.). (Bot. Mag. Vol. V. 8,254).

7. Mussænda Parryorum Fischer.

A scandent shrub, branches terete. *Bark* brown or yellowish brown, pubescent at the nodes, more or less lenticellate, young parts tomentose (without lenticel). *Leaves* 3-6 by 2-3 in., elliptic, acuminate; young leaves tomentose, adpressed brownish pubescent on the nerves above in maturity; lateral nerves 7-9 on either half, prominent above, ultimate reticulation very minute; base gradually attenuate; petiole .12-.6 in. long, adpressed brownish pubescent; stipules triangular, lanceolate, acuminate, often bifid at the apex, .17-.2 in. long. *Flowers* in diffused sessile cyme, branches of which are finely greyish tomentose; bracts 2; bracteoles 3, linear, brown pubescent; pedicels short. *Calyx* .12-.17 in. long, tube very short; teeth 5, very rarely 6, linear, brownish pubescent; enlarged foliaceous segment white, elliptic, acute or acuminate, up to 3.3 in. long, and .17 in. broad, 7-nerved towards the base. *Corolla* 1 in. long; buds clavate; tube narrow cylindrical, inflated upwards, greenish grey, somewhat hairy outside, glabrous inside towards the base; lobes 5, patent, suborbicular or reniform, cuspidate, .1 in. long. *Stamens* 5; filaments short;

anthers linear, .2 in. long. *Ovary* turbinate, .12-.17 in. long, hirsute; style filiform, dilated towards the apex; stigma 2, smooth. *Fruit* baccate, .3 in. long, black when dry, very finely brown pubescent.

ASSAM, LUSHAI HILLS ascending up to 1,500 ft. (Kew bulletin 1928 No. 6, p. 274. Sheet no. 358 of Mrs. Parry).

8. *Mussænda Pentasemia* Fischer.

A handsome shrub 4-7 ft. high; branches terete brown, pilose; young branches angled, densely villous. *Leaves* 3-6 by 1.5-3 in., sub-equal, elliptic or broadly ovate, acute or acuminate, sub-undulate, finely pilose above, densely pilose below; lateral nerves 9-12 on either side, more or less prominent; secondary nerves transverse, reticulation very fine; base frequently attenuated and more or less decurrent, rarely round; petiole .2-.8 in. long; stipules ovate, .2-.4 in. long, sub-acute, often bifid towards the apex, densely brownish villous. *Cymes* terminal, bracteate, 1.2-2 in. long; rachis villous; bracts upto .6 in. long, lanceolate, cordate or bifid. *Flowers* sub-sessile. *Calyx* obscure; segments 5; the enlarged segment white, elliptic-lanceolate, acuminate, attenuated towards the base, 1.5-2.5 in. by .4-.6 in., elliptic-oblong or sub-orbicular, cuspidate (upto 4.8 in. long and 2.5 in. broad), setose on both sides. *Corolla* tube narrow-cylindrical, broadened at the top, densely yellowish pilose, .8 in. long, brownish yellow; lobes 5, patent, round, .2-.25 in. long, setose outside, glabrous inside. *Stamens* 5; anthers linear, included, flattened, sessile, .2 in. long. *Ovary* narrow, .17-.2 in. long, densely villous; style filiform; stigma clavate, bifid, smooth. *Fruit* oblong, baccate, .3-.4 in. long, green when dry, smooth. *Seeds* minute, sub-orbicular, compressed; testa black, foveolate.

LUSHAI HILLS ascending 2,150 ft. (Kew bulletin 1928, No. VI, p. 275. Mrs. Parry, 275).

Acranthera tomentosa Br.

A hirsutely tomentose epiphyte. *Leaves* 4-10 in. long, elliptic or oblanceolate, acute, hirsute. *Flower* bluish in subterminal bracteate cymes. *Calyx* segments linear-lanceolate, .6-1 in. long. *Corolla* villous; tube funnel-shaped. *Stamens* 5, included. *Ovary*

1-celled, fusiform; style filiform. *Berry* 1·5 in. long with persistent calyx-lobes.

KHASI HILLS; CACHAR (Keenan).

(*F.B.I.*, p. 92, Vol. III).

Polysolenia Wallichii Hk. f.

An erect glabrous undershrub. *Leaves* 3·5 in. long, lanceolate, acuminate, pubescent; nerves slender; base narrowed into a petiole, ·25-1 in. long; stipules ·3·5 in. long. *Flowers* in solitary terminal peduncled heads. *Calyx-tube* short; segments 5, broadly ovate. *Corolla* pubescent, 1·1-2·5 in. long. *Ovary* 2-celled; style filiform; stigma short, dilated; ovules many, placenta peltate.

KHASI HILLS; CACHAR (Keenan)

(*F.B.I.*, p. 94, Vol. III).

19. MYCETIA Reinw.

Mycetia longifolia O. Ktze. Syn. *M. javanica* Reinw = *Adenosacme longifolia* Wall.

An undershrub or small shrub; stem greyish-yellow; branches rigid, bristly. *Leaves* 3-10·5 by ·8-3·3 in., entire, margins sparsely ciliate, elliptic to obovate-lanceolate, acute, often caudate-acuminate, membranous, more or less pubescent, mainly on the underside; base narrowed into a slender petiole; petiole puberulous, ·2-1 in. long; stipules small, membranous, lanceolate, oblong, ·3·5 in. long. *Flowers* yellowish, in compound trichotomous zigzagly branched subterminal cymes, dimorphic (*a*) short-styled; anthers inserted at the base of the corolla tube, (*b*) long-styled; anthers inserter on the mouth of the corolla tube. *Calyx-tube* hemispheric or sub-globose, not produced beyond the ovary; teeth 4-6, lanceolate, persistent, sinus glandular. *Corolla* tube campanulate, fleshy; lobes small, 4-6, valvate in bud with everted edges. *Stamens* 4-6; filaments short; anthers linear, oblong. *Ovary* 2-celled; style short; stigmas 2. *Berries* globose, broader than long, ·25 in. across, fleshy, spongy and snow-white, crowned with the membranous calyx-teeth. *Seeds* many, black, angled or minute, compressed, rugose; juice sweetish; embryo minute; albumen fleshy.

NAGA HILLS, LUSHAI HILLS, NOWGONG, KHASI HILLS, ascending up to 5,000 ft.

Flrs. 10-11. Fr. cold season.

20. MYRIONEURON Wall.

Myrioneuron nutans Wall.

A small shrub, sometimes climbing (Brandis); branches stout, old stem white with soft corky bark. *Leaves* 5-9 by 2·5-5 in., obovate-elliptic, acuminate, sub-coriaceous, glabrous above, subscabrid beneath, specially along the nerves; lateral nerves 15-20 on either half, arched and anastomosing at the extremity; tertiaries also strong, transverse to the secondary; quarternaries also conspicuous and form a fine pattern; stipules erect, oblong-lanceolate, about 1 in. by ·2 in. *Flowers* white (fading into dull yellow), in dense pedunculate bracteate corymbose cymes from the axils of the uppermost leaf. *Bracts* rigid, lanceolate. *Calyx* teeth subulate, exceeding the corolla, persistent. *Corolla* tubular; lobes short, erect, hispid, valvate in bud; throat villous. *Stamens* 5, adnate to the corolla-tube; filaments short, subulate; anthers linear, included. *Ovary* 2-celled; style short; stigma 2, linear-oblong, cohering. *Berries* white, about ·15 in. across, globose, crowned by the scarious calyx-teeth, many seeded. *Seeds* black, minute, angular; testa pitted; albumen fleshy.

N. E. FRONTIER TRACT, CACHAR, SYLHET, KHASI HILLS, GOALPARA, CENTRAL ASSAM.

Flrs. 10-12. Fr. 12-2.

Keenania modesta Hook. f.

A low sub-herbaceous herb. *Leaves* 6-12 by 1·5-3 in., opposite, elongate-lanceolate, abruptly acuminate, membranous, puberulous beneath; lateral nerves 15-20 on either half; base narrowed into the petiole ·75-1 in. long; stipules ·5-1 in. long. *Heads* globose, nodding, 1 in. across. *Calyx* ·3 in. long. *Corolla* tube inflated, glabrous, throat with a ring of stiff hairs. *Ovary* 2-celled; style short; stigmas 2, flat; ovules 8.

CACHAR (Keenan)

(F.B.I., p. 101, Vol. III).

21. WEBERA Schreb. (Tarenna Gærtn.)

Trees or shrubs. *Leaves* usually drying black; stipules triangular-ovate, usually deciduous. *Flowers* bracteolate,

sessile or pedicellate, usually pentamerous, in terminal corymbose compound cymes. *Calyx-tube* ovoid or turbinate; limb 5-fid, rarely 4, produced beyond the ovary. *Corolla* funnel-shaped; throat glabrous or pubescent; lobes 5, rarely 4, contorted. *Stamens* 5, rarely 4 on the throat or mouth of the corolla; filaments short or 0; anthers slender, exserted. *Ovary* 2-celled; style stout, usually pubescent; stigma stout, fusiform, grooved, usually exserted; ovules usually numerous, rarely few or solitary, often immersed in the fleshy peltate placenta. *Berry* small, globose. *Seeds* plano-convex or cup-shaped; embryo small; albumen fleshy or horny; cotyledons foliaceous.

I. Ovules 2 or more in each cell :—

Corolla glabrous without :—

Berries ultimately black, leaves coriaceous. 1. *W. corymbosa*.

Corolla hairy outside :—

Corolla-tube shorter than the lobes.

Leaves membranous :—

Leaves black when dry. Berries many-seeded. 2. *W. odorata*.

Leaves olive-brown when dry. Berries 2-seeded. 3. *W. disperma*.

Corolla-tube equalling the lobes :—

Leaves rigidly coriaceous. 4. *W. pumila*.

II. Ovules solitary in each cell :—

Corolla throat villous; lateral nerves 8-10 on either half. Corolla funnel-shaped. 5. *W. Kurzii*.

Corolla throat glabrous; lateral nerves 12-15 on either half. Corolla campanulate. 6. *W. campaniflora*.

1. *Webera corymbosa* Willd. *Tarenna asiatica* O. Ktze (modern name).

A large evergreen shrub or small tree. *Bark* greyish-brown with very thin cuticle, inside greenish white, leathery, .12 in. thick; young shoots often covered with resinous excrescence. *Leaves* 3-6 by 1-2 in., elliptic or oblong, lanceolate, entire, coriaceous, apex acute or acuminate, glossy, shining above, often glaucous beneath; lateral nerves 6-10 on either half, abruptly turned upwards at the margin; base acute; petiole .1-5 in. long, stout; stipules

coriaceous, triangular from a broad base, subpersistent. *Flowers* white, fragrant, in terminal trichotomous compound sparsely hirsute cymes. *Calyx* .12 in. long, sparsely pubescent; teeth triangular, ciliate. *Corolla* .4 in. long in the bud; tube pubescent; lobes sub-acute, villous at the mouth, twisted to the left. *Berries* ultimately black, the size of a pea, crowned by the calyx which often becomes deciduous leaving a conspicuous scar. *Seeds* 6-10, shaped like orange segments; albumen horny; embryo cells pitted with oil.

N. C. HILLS (above Jatinga).

Flrs. 4-6. Fr. 8-1.

2. *Webera odorata* Roxb. = *Tarenna odorata* Robens (modern name) Vern. *Vokmit*, *Parmathim*, Lushai.

A shrub or small tree. *Bark* grey; blaze light pink. *Leaves* black when dry, 2.5-9 by 1.2-5 in., elliptic-lanceolate, entire, acuminate, membranous, glabrous; lateral nerves 6-9 on either half, ascending; base acute; petiole .2-.6 in. long; stipules deciduous. *Flowers* pedicellate, in corymbiform pubescent cymes; bracts linear. *Calyx* minutely toothed. *Corolla* tube .25 in. long, slender, shorter than the lobes. *Ovules* few, size of a pea (Roxb).

LUSHAI HILLS, MANIPUR (Clarke), KHASI HILLS, ascending up to 4,000 ft.

Flrs. 9-10. Fr. Cold season.

3. *Webera disperma* Hk. f.

A shrub or a small tree. *Leaves* 3.5-5 by .8-2 in., olive-brown when dry, elliptic or lanceolate, entire, acuminate, membranous, glabrous; lateral nerves 10-11 on either half; base acute; petiole .2-.6 in. long; stipules lanceolate. *Flowers* in shortly peduncled pubescent cymes. *Calyx* obtusely toothed. *Corolla* tube broad, pubescent, shorter than the lobes. *Ovary* with 2 ovules in each cell. *Berries* 2-seeded.

SIBSAGAR (Barpathar) Nambor Forests (Mann); KHASI HILLS (Mann)—ascending up to 4,000 ft.

Flrs. 2-5. Fr. Cold season.

4. *Webera pumila* Hk. f.

A dwarf bushy shrub with stout branches growing near edges of streams; stem greyish brown. *Leaves* sub-sessile, .8-3 by .15-.4 in., narrow spatulate or lanceolate, often oblique, entire, recurved apiculate, rigidly coriaceous; lateral nerves about 5 on either half, obscure; petiole very short; stipules tailed, pubescent. *Flowers* white, .6-.8 in. long, in small subcapitate terminal hirsute cymes; buds club-shaped. *Calyx* teeth minute. *Corolla* tube and lobes about .25 in. long. *Ovary* cells 3-5 ovuled. *Berries* size of a small pea, globose, .2 in across. *Seeds* angled.

Gauhati (Kurz), N. C. HILLS (Dehing bank), KHASI HILLS (Barpani River)—ascending up to 2,000 ft.

Flrs. 1-2. Fr. 9-10, or both throughout the year.

5. *Webera Kurzii* Hk. f.

A shrub or small evergreen tree. *Leaves* 5-8 by 1.5-2.5 in., elliptic or obovate-lanceolate, entire, acuminate, membranous, glabrous above, pubescent beneath; lateral nerves 8-10 on either half; base acute; petiole .3-.5 in. long. *Flowers* white, ebracteate, pedicellate, in sessile or almost sessile trichotomous terminal cyme. *Calyx* teeth triangular, obtuse. *Corolla* glabrous outside; throat villous; lobes longer than the tube. *One ovule* in each cell of the ovary. *Seeds* deeply excavated centrally; testa coriaceous.

(Garampani) SIBSAGAR (U. Kanjilal).

Flrs. 4 (Burmah). Fr. Cold season.

6. *Webera campaniflora* Hk. f.

A shrub. *Leaves* 3.5-5 by 1-2.3 in., almost black when dry, elliptic or elliptic-lanceolate, entire, shortly acuminate, glabrous above, pubescent or puberulous beneath; lateral nerves 12-15 on either half; base acute, occasionally rounded or obtuse; petiole .3-.7 in. long; stipules deciduous, cuspidate. *Flowers* pedicellate (Assam form), in terminal corymbose cymes; bracteoles 2 on each pedicel. *Calyx* hirsute; teeth larger than ovary. *Corolla* .6 in. long with a short villous tube, spreading into a large campanulate limb; throat glabrous. *Anthers* long, sessile. *Style* short, hairy;

stigma long, fusiform; one ovule in each cell of the ovary.
Fruit globose.

Phulertal (CACHAR).

Flrs. 8-9. Fr. Cold season.

Webera Schreb is now combined with the genus *Tarennia* Gært. *T. asiatica* O. Ktze, and *T. odorata* Robins are modern names for *W. corymbosa* Willd and *W. odorata* Roxb. The combinations for the remaining species appear not to have been made so far.

22. BRACHYTOME Hook. f.

Brachytome Wallichii Hk. f.

A shrub or small tree 20-25 ft. high; branches terete. *Leaves* 4-9 by 1-2 in., entire, oblong-ovate, lanceolate, caudate-acuminate, membranous, glabrous or hoary above, inconspicuously puberulous beneath; lateral nerves 7-12 on either half, slender; base acute; petiole .2-.6 in. long; stipules triangular, persistent. *Flowers* rather small in polygamodiceous irregularly branched compound cymes from the axils of the uppermost leaves. *Calyx-tube* oblong; limb cup-shaped; teeth 5, persistent. *Corolla* funnel-shaped; lobes 5, short, twisted in bud. *Stamens* 5, inserted on the corolla throat; anthers subsessile, included, linear-oblong, imperfect in female flower. *Disk* in female flower small, in male flower cupular. *Ovary* 2-celled; style filiform; stigmas 2; ovules numerous. *Berries* small, ellipsoid, 2-celled, many seeded, crowned with the calyx limb. *Seeds* crowned, cuneate, compressed; testa thin, reticulate; albumen fleshy.

KHASI HILLS, 3-4,000 ft.

Flrs. 3-4. Fr. 10-11.

23. GARDENIA Linn.

Gardenia campanulata Roxb. Vern. *Gandaphaji*, Mech; *Darichik*, *Rukhawak*, Garo; *Bitmara*, *Dhubiu-khola*, Ass.; *Dieng-chhi*, *Dieng-soh-lah-kaskei*, *Soh-mai*, Khasi; *Biolem*, Sylh.; *Lam-lei-bi*, Manip.

A large shrub or a small tree armed with spinescent abortive branches. *Bark* greyish smooth, inside greenish grey.

Shoots puberulous. *Leaves* opposite or ternate, 1-4 by .5-1.8 in., elliptic-ovate or oblanceolate, entire, bluntly acute or acuminate, coriaceous, glabrous; lateral nerves 5-6 on either half, inconspicuous; midrib slender; base narrowed into a short petiole; petiole .2-.6 in. long; stipules intra-petiolar, free, triangular, deciduous. *Flowers* dimorphic, *male flowers* (with sterile ovary) fascicled; bisexual flowers sessile, solitary; buds not resinous. *Calyx* of male flower 3 in., urn-shaped; mouth truncate, dilated; of bisexual flower-limb campanulate, segments contorted. *Corolla* campanulate; tube .25-.3 in.; lobes short, obtuse. *Stamens* as many as corolla lobes; anthers included, sessile or nearly so. *Ovary* 1-celled; style stout; stigma green, deeply 5-lobed; placenta 2-6, parietal; ovules numerous. *Fruit* not beaked, ellipsoid or subglobose, obscurely 5 ridged with fleshy pericarp. *Seeds* numerous, compressed, embedded in the placenta; testa thin, albumen horny; embryo minute.

GOALPARA, GARO HILLS, KAMRUP, SIBSAGAR, LAKHIMPUR, N.-E. F. TRACT, SYLHET, CACHAR, DARRANG and KHASI HILLS ascending up to 1,200 ft.

Leaves and fruits are eaten cooked. Boiled fruit is used for washing purposes.

Flrs. 3-4. Fr. 10-11.

***Gardenia coronaria* Ham.**

A deciduous tree or large shrub; buds resinous. *Bark* greyish, splitting in small cylindrical pieces enclosing the branchlets on drying. *Leaves* 3-7 by 1.5-3 in., entire, obscurely crenate toward the apex, obovate, acuminate, glabrous; base narrowed into a short petiole; stipules connate; lateral nerves quite conspicuous underneath, 11-13 on either half, arcuate at the margin. *Flowers* solitary, axillary. *Calyx-tube* upto 1.2 in., often split on one side upto the middle. *Corolla* white, fragrant; tube upto 3 in. long; lobes 5. *Fruit* ellipsoid, ribbed, about 1.2 by .6 in.

SYLHET (13,927 and 13,928).

Flrs. & Fr. (Mature) 5.

***Gardenia turgida* Roxb.**

A small deciduous tree, armed with strong axillary often leaf bearing spines; bark smooth, bluish or pale grey. *Leaves* often crowded on dwarf shoots, 1-4 in. long, obovate, elliptic, obtuse or bluntly acuminate, coriaceous, tomentose beneath, sessile or narrowed into a short decurrent petiole; stipules distinct, caducous. *Flowers*

fragrant, polygamous, solitary or fascicled (upto 4). *Calyx* subtruncate. *Corolla* white; tube .3-.5 in. long, slightly dilated upwards; lobes oblong, longer than the tube. *Stamens* as many as costa lobes; anthers sessile. *Ovary* 1-celled; ovules numerous on persistent placenta. *Fruit* globose, 1-3 in. across, mealy outside.

SYLHET (F. B. I. P. 118, Vol. III).

The fruit is said to be eaten cooked.

Flrs. 3-5. Fr. Cold season.

24. RANDIA Linn.

Small trees or shrubs, unarmed or spinous. *The* spines usually in opposite pairs axillary to the branchlets. *Leaves* often fascicled on arrested branchlets or opposite with one of the pair often arrested; stipules intrapetiolar, short, free or connate. *Flowers* often dimorphic, white or yellowish, large or small, solitary or fascicled or in axillary or leaf opposed cymes. *Calyx-tube* ovoid or turbinate; limb often tubular; segments 5. *Corolla* campanulate, funnel-shaped or salver-shaped; tube long or short, usually with a ring of hairs within; lobes usually 5, twisted to the left. *Stamens* 5; anthers sub-sessile. *Ovary* generally 2-celled; ovules usually numerous, sunk in fleshy placentas; style slender; stigma fusiform, entire or bifid. *Fruit* a globose, ovoid or ellipsoid, 2 celled, many seeded berry. *Seeds* angular, often embedded in pulp; albumen horny.

Armed :—

Leaves glabrous :—

Fruit .3 in. long, 4-seeded. A shrub. 1. *R. tetrasperma*.

Fruit 1-2 in. long, many seeded, purple; spines decussate, short at the ends of arrested branchlets. A small tree. 2. *R. uliginosa*.

Fruit .3-.5 in. long; spines short, recurved. Leaves coriaceous. A rambling shrub. 3. *R. longiflora*.

Fruit .3 in. long; spines short, straight or wanting; leaves membranous. A shrub. 4. *R. griffithii*.

Leaves pubescent or tomentose :—

Flowers usually solitary; berries about 1.5 in. long, yellow when ripe. .. 5. *R. dumetorum*.

Flowers in cymes or fascicles; berries small, .25-.3 in. long, purple. .. 6. *R. fasciculata*.

Unarmed :—

Calyx-teeth minute. Corolla less than

1 in. :—

Flowers white. Corolla .6-.8 in.
across. Berry .3 in. A middle sized
tree. 7. *R. densiflora*.

Flowers yellow. Corolla .5 in. long.
A small tree or shrub. 8. *R. Wallichii*.

1. *Randia tetrasperma* Roxb.

A small erect rigid shrub with stiff branches and branchlets. *Bark* brown, fairly smooth, exfoliating in rather thick irregular scales. *Branches* subspinescent. *Leaves* variable, approximate at the ends of arrested branchlets, .5-2 by .15-.6 in., obovate to oblanceolate, glabrous, narrowed into a short petiole; stipules small, acute or acuminate. *Flowers* pentamerous, sessile, fragrant, greenish white, solitary. *Calyx-tube* turbinate; segment subulate with deltoid bases. *Corolla-tube* .3 in. long; lobes oblong. *Anthers* exserted. *Stigma* fusiform. *Berry* globose, .25-.35 in. across, purple, tipped with persistent calyx segments.

SYLHET (Hooker).

Flrs. 4-6. Fr. Cold season.

2. *Randia uliginosa* DC. Vern. *Bon-Bongana*, Ass.; *Agendra*, *Suskeng*, Garo; *Pirala*, Beng.; *Kendu*, Jharua; *Chehepi-arong*, *Chehepi*, Mik.; *Bonaphi-phang*, Kach.; *Thing-pui*, Kuki.

A small rigid deciduous tree. *Bark* reddish-brown with horizontal cracks; branchlets quadrangular, pubescent when young; spines decussate at the ends of arrested branchlets. *Leaves* 2-8 by 1-3.5 in., often crowded at the ends of branchlets, obovate or obovate to oblong, shining above, often pubescent along the nerves beneath; lateral nerves 6-8 on either half; base cuneate; petiole .3 in. long; stipules triangular. *Flowers* white, solitary, 1-2 in. across, dimorphic, peduncled and small or sub-sessile and large. *Calyx-tube* .5-1 in. long; segments rounded. *Corolla* spreading; tube usually short; lobes 5-7, rounded. *Stamens* 5-7, sessile; the large (sub-sessile) form with a ring of hairs at the throat of the corolla tube and bi-lobed stigma, the

smaller form (functionally male) with a very short corolla tube glabrous within and undivided stigma. *Fruit* about 2 in. across and crowned with the persistent calyx segments, 2 celled.

NOWGONG, DARRANG, GARO HILLS, N. C. HILLS, GOALPARA.

The fruit is eaten and the leaves are browsed by deer and cattle.

Flrs. 5-6. Fr. Cold season.

3. *Randia longiflora* Lamk. Vern. *Pulikaint*, *Boroki-amkora*, Ass.; *Subekbekarikang*, *Popung-rikang*. *Yang-tar-long*, Mik.; *Rhuibaikoy*, Lushai; *Bechuk*, Tipp.; *Silanasugur*, Mech; *Jermei-siatiew-krot*, *Mei-sia*, Khasi; *Bairauathi-doukha*, Kach.; *Yengokjaching*, Garo.

A large rambling and climbing glabrous shrub. *Bark* grey, smooth, light red with brown streaks inside; thorns recurved. *Leaves* 2-8 by .8-4 in., ovate-elliptic or oblong, entire, abruptly acute, coriaceous, glabrous; lateral nerves 5-6 on either half, occasionally glandular at the nerve-axils; base cuneate; petiole .2-.8 in. long; stipules triangular with a broad base. *Flowers* puberulous, white, fragrant, in axillary or leaf opposed shortly peduncled trichotomous cymes (often from alternate axils of reduced leaves). *Calyx* tube dilated; segments triangular. *Corolla* tube much longer than the lobes. *Stigma* bifid. *Berry* obscurely ribbed, .3-.5 in. long, black when ripe, about 8 seeded; albumen ruminant.

LUSHAI HILLS, SIBSAGAR, NOWGONG. SYLHET, CACHAR, GOALPARA, GARO HILLS, N. C. HILLS.

Wood cream colour.

Flrs. 10-11. Fr. 12-1.

4. *Randia griffithii* Hk. f. Vern. *Dieng-soh-ladung*, Synt.

An erect shrub or small tree with straggling branches; branchlets marked with prominent hairy ridges indicating the nodes. *Bark* greenish-grey, dark-green underneath the very thin corky layer, .1 in. thick; spines ascending. *Leaves* 2-5 by .5-1.5 in., ovate or ovate-lanceolate, acuminate, entire, membranous or thinly coriaceous, glabrous, shining; lateral nerves 6-8 on either half; base acute; petiole .1-.4 in. long,

margined; stipules subulate. *Flowers* 5-merous in few flowered, sub-sessile terminal cymes; bracts connate. *Calyx* .25 in. long, funnel-shaped; limb dilated, minutely toothed, deciduous. *Corolla* tube short; lobes elliptic, .4-.5 in. long. *Ovary* stipitate, lengthening in fruit. *Berries* black, 2-celled, 2-4 seeded, globose, .25-.35 in. across.

KHASI HILLS.

Fls. 5-7. Fr. 10.

5. *Randia dumetorum* Lamk. Vern. *Behmona*, Mon, Ass.; *Ruthi*, *Ruthi-arong*, Mik.; *Rupanthou*, *Rithai-phang*, Monraing, Kuki; *Biskhanhokra*, Mech; *Dieng-makasing-khlaw*, Kh.; *Kotoh-bih*, Darrang; *Biolom*, Sylh.; *Buro-mayna*, Mech; *Thiskeng*, Garo.

A large deciduous shrub or sometimes a small tree with stout axillary spines. *Bark* dark-brown or grey, somewhat rough. *Leaves* 1-3.5 by .8-1.5 in., generally fascicled on arrested branchlets, obovate or oblanceolate, roundish or obtusely short, acuminate or acute, pubescent, rough or glabrous; lateral nerves 5-7 on either half, sub-parallel; base narrowed into a short marginate petiole; petiole .1-.4 in. long; stipules ovate, acuminate. *Flowers* sub-sessile, .7-1 in. across, greenish white or yellowish, fragrant, solitary or 2-3 together on short lateral branchlets. *Calyx* strigose; tube .2-.3 in. long, campanulate; segments variable, ovate or lanceolate or spatulate, foliaceous, as long as the tube. *Corolla* covered with adpressed silky hairs; tube not exceeding the calyx; lobes spreading, oval or oblong. *Stigma* fusiform. *Berry* soft, fleshy, .1-1.5 in. long, globose or ovoid, yellow when ripe, usually tipped with persistent calyx. *Seeds* compressed, imbedded in a gelatinous pulp.

GOALPARA, NOWGONG. GARO HILLS, KAMRUP. N. C. HILLS, KHASI HILLS, DARRANG.

Fruit used for poisoning fish and is considered to be one of the best and safest emetics in Indian medicine.

Flrs. 4-5. Fr. Cold season.

6. *Randia fasciculata* DC. Vern. *Horu-moyan*, *Pulikaint*, Ass.; *Suho*, Mik.

A handsome spreading shrub or a small tree with short axillary spines; branchlets pubescent. *Bark* greenish-grey,

warty, .16 in. thick, having minute vertical lines, green below the cuticle. *Leaves* 1-8 by .43 in., oblong-lanceolate, elliptic or ovate, acute or acuminate, entire, membranous, dark-green and shining, glabrous; lateral nerves 9-11 on either half, usually rounded at the base; petiole .2-.8 in. long; stipules narrow, lanceolate. *Flowers* white, fragrant, bracteate, 1 in. across, usually in 3-flowered cymes at the ends of branchlets, sometimes axillary and fasciculate. *Calyx* pubescent; teeth linear, deciduous. *Corolla* tube slender; lobes broad, oblong, often apiculate, hairy at the base. *Anthers* sub-sessile at the mouth of the corolla-tube. *Stigma* slightly exserted, fusiform. *Berry* purplish black when ripe, globose, .25 in. across with 10-12 angular seeds.

KHASI HILLS, LAKHIMPUR, CACHAR, NOWGONG, KAMRUP, N. C. HILLS.

Wood cream colour.

Flrs. 3-5. Fr. Cold season.

7. *Randia densiflora* Benth. Vern. *Dieng-iong-blei*, Khasi; *Parsaru*, Kuki.

A tree (60'/45"). *Bark* greyish-brown, smooth, with distant slender horizontal wrinkles, green beneath the cork; mattedly fibrous and reddish-brown inside, soft near cambium, soon turning darkish-brown. *Branchlets* opposite, quadrangular. *Leaves* 2.5-7 by .6-3 in., bifarious, entire, smooth, elliptic-oblong or lanceolate, acuminate, coriaceous; lateral nerves 5-7 on either half; base acute; petiole .2-.5 in. long; stipules triangular, acuminate, deciduous. *Flowers* 5 merous, subsessile, pale yellow, .6-.8 in. across, in much branched leaf opposed scorpioid cymes; bracts persistent. *Calyx* bowl-shaped; teeth triangular, acute. *Corolla* tube .16 in. long; lobes linear-oblong, twisted to the right in bud; throat hairy. *Anthers* .25-.3 in. long, radiating from angles of corolla lobes. *Stigma* exserted.

CACHAR, SIBSAGAR, KHASI HILLS, MIKIR HILLS.

Flrs. 12-2. Fr. not seen.

8. *Randia Wallichii* Hk. f. Vern. *Supin-um-soh-arong*, Mik.; *Ching-kabak*, Naga; *Buleng*, Saphut, Kuki; *Shundi* (?)

* Fruit-August, a berry, .1 in. across. Collected from Desoi reserve. Sibsagar Divn.—R. N. De.

Cach.; *Dieng-soh-lakhai-shree*, Khasi; *Dieng-sa-sling-khni*, Synt.; *Theng-okri*, Mik.; *Teslem-phang*, Kach.

A tree (up to 50'/24"). *Branches* flexuous. *Bark* greyish to blackish-brown, exfoliating in irregular flakes, .12-.25 in. thick; inside light brown, irregularly mottled and granular. *Leaves* 2-10.5 by .5-2.8 in., elliptic, lanceolate, long acuminate, entire, coriaceous, shining above, slightly pubescent beneath, with scattered glandular pits; lateral nerves 10-12 on either half; base narrowed into the petiole (.2-1 in. long); stipules sessile, coriaceous, enclosing buds, caducous. *Flowers* yellowish, fragrant, in leaf opposed or axillary cymes; branches spreading. *Calyx* turbinate; teeth small. *Corolla* .5 in. across, salver-shaped with slender tube, much shorter than the lobes. *Anthers* in the sinuses of the corolla lobes. *Stigma* entire. *Berries* globose, often speckled with white len'icels, many seeded. *Seeds* peltate; cotyledons small, flat, rounded.

KHASI HILLS, N. C. HILLS, CACHAR, NOWGONG.

Wood cream colour, much prized in Cachar.

Flrs. 5. Fr. Cold weather.

25. HYPTIANTHERA W. & A.

Hyptianthera stricta W. & A. Vern. *Boldiki*, Garo; *Tantharu-bom-phang*, Mech; *Thingsairangal*, Lushai.

An aromatic evergreen shrub or small tree; stem brown, reticulately fissured; branches thin, 4-angled or somewhat compressed. *Leaves* decussate, 2-7 by .7-2 in., narrow-elliptic, oblong or linear-lanceolate, entire, somewhat slightly undulate, finely caudate-acuminate, glabrous and shining above, pubescent on nerves beneath when young; lateral nerves 6-7 on either half; base rounded or cuneate; petiole .15-.5 in. long; stipules caudate-acuminate, persistent. *Flowers* about .15 in. long, sessile, in dense axillary cymes; bracts minute, lanceolate, acute, ciliate. *Calyx* with a short tube; teeth ovate, acute, hairy inside. *Corolla* shorter than the calyx, tubular; lobes 4-5, twisted. *Anthers* 4-5, sessile, inserted by the back. *Disk* epigynous, annular, pulvinate. *Ovary* 2-celled, with 4-10 pendulous ovules in each cell; style solitary; stigma bifid, white, brush-like. *Berries* .3 in.

long, more or less globose, crowned by the persistent calyx, black when ripe, juicy. *Seeds* angled and compressed; testa fibrous and plaited; embryo small.

GARO HILLS, DARRANG, SYLHET, LUSHAI HILLS, GOALPARA and KHASI HILLS (Hooker).

Flrs. 2-3. Fr. 4-5.

26. TRICALYSIA A. Rich.

Tricalysia singularis K. Schum. Syn. *Diplospora singularis* Korth. Vern. *Pondonje-bephang*, *Kehoba-aiong*, Mik.; *Thing-sai*, Lush.; *Thingsai-ranga*, Kuki; *Sa-rangal*, Tipp.; *Gongar-samphet*, Mech; *Khukru*, *Garokhukru*, *Kakoi-chira*, Ass.; *Bol-khung-khang*, *Boljakingsok*, Garo.

A tree 50' / 48" (90 to 100 ft., *Prazer in Cachar*) with resinous fluted stem and narrow crown. *Bark* smooth, greyish-brown; old bark peeling off in pieces easily, having fine vertical fissures; blaze pale or greenish-brown, darkening on exposure; old leaves bright yellow. *Leaves* bifarious, 3-7 by 1-2.5 in., oblong or elliptic-oblong, entire, acuminate, coriaceous, shining above, pale beneath; lateral nerves 6-9 on either half, slender; axil often gland pitted; base cuneate or acute; petiole .2-.5 in. long; stipules long acuminate, triangular. *Flowers* 4-merous, greenish-white, sub-sessile, about .6 in. across, often polygamous, supported by connate bracts, in shortly peduncled cymes mostly from the leaf scars consisting of 4 groups of 3 flowers and a terminal one. *Calyx* teeth enlarging after flowering. *Corolla* green, salver-shaped; lobes 4-5, linear-oblong, throat villous. *Stamens* on the mouth of the corolla tube; filaments short; anthers linear, exserted. *Ovary* 2-celled; stigma spatulate. *Fruit* baccate, cherry-like, .7-.8 in. across, purplish black when ripe, crowned by the persistent calyx-limb. *Seeds* flattened, imbricated, 4-7.

SIBSAGAR, NOWGONG, LUSHAI HILLS, CACHAR, SYLHET, GOALPARA, GARO HILLS, KAMRUP and N. C. HILLS ascending up to 4,000 ft.

Wood white, compact. Used for posts.

Flrs. 4-5. Fr. Cold season (persists long on the tree).

27. KNOXIA Linn.

Knoxia corymbosa Willd. Vern. *Iang-haik*, Khasi.

An erect slender annual herb; stem obscurely angled. *Leaves* 1·5-5 by ·5-1 in., lanceolate or linear-lanceolate, acuminate, grey pubescent; lateral nerves 7-9 on either half, ascending, very slender; base narrowed into the short petiole (·1-·3 in. long); stipules connate with the petiole into a bristly sheath. *Flowers* 4-merous, light purple, dimorphous, in spicately corymbose lax cymes. *Calyx-segments* equal or nearly equal, one slightly longer; tube persistent. *Corolla* throat villous. *Carpels* connate into a 2-celled ovary; style filiform; stigma 2 lobed; ovules pendulous, solitary in each cell. *Fruit* 4-angled of 2 separating cocci, ripe fruit separating from the persistent columella by a basal perforation. *Seeds* with membranous testa; albumen fleshy; cotyledons very small; radicle superior.

KHASI HILLS ascending up to 4,000 ft.

Flrs. 10. Fr. Cold season.

Octotropis terminalis C. B. Clarke.

A glabrous shrub; branches quadrangular. *Leaves* petiolate, lanceolate or elliptic, narrowed at both ends; stipules short, persistent, subulate. *Cymes* fasciculate in the axils of the uppermost leaves. *Calyx* margins entire. *Corolla* white; tube narrowly cylindric, ·75 in. long; lobes 5, imbricate. *Anthers* 5, oblong, included in the corolla tube. *Stigma* oblong, subentire, exserted. *Ovary* 2-locular. *Ovule* solitary; the septum which divides the ovary in two cells is exceedingly thin, and probably fails altogether. *There* is certainly no placental thickening near the centre of the ovary and the ovules are attached near its summit.

SIBSAGAR (Nambor forests), NAGA HILLS (No. 40812).

C. B. Clarke Journ. Linn. Soc. XXV. 33, t. 17.

28. CANTHIUM Lam.

Shrubs or small trees, armed or unarmed, erect or climbing. *Leaves* with nerve axils often glandular; stipules connate. *Flowers* small, white or greenish, sometimes polygamous, in axillary fascicles or peduncled corymbose cymes. *Calyx-tube* shortly produced beyond ovary, 4-5 toothed, persistent or deciduous. *Corolla* tube urceolate, campanulate, funnel-shaped or globose with a ring of deflexed hairs within; throat villous; lobes small, 4-5, valvate, at length

reflexed. *Anthers* 4-5, sub-sessile on the throat or mouth of the corolla. *Ovary* 2-celled; style short; stigma large, usually ribbed; ovules pendulous, solitary in each cell. *Drupe* sub-globose or didymous, with 2 pyrenes or 2-celled putamen or 1-celled from abortion, reniform or oblong. *Seeds* oblong; testa membranous; albumen fleshy; embryo elongated with short cotyledons.

Unarmed; flowers pentamerous :—

Leaves coriaceous. Corolla tube campanulate. Pyrenes more or less tubercled. .. 1. *C. dicoccum*.

Leaves thinly coriaceous. Corolla tube sub-globose. Pyrenes quite smooth. .. 2. *C. glabrum*.

Unarmed; flowers tetramerous :—

Leaves membranous. 3. *C. gracilipes*.

Armed; flowers pentamerous :—

Leaves glabrous and glossy. 4. *C. angustifolium*.

Leaves pubescent. 5. *C. parvifolium*.

1. *Canthium dicoccum* Merr = *C. didymum* Roxb.

A low branched tree 55'/60" or a stout large evergreen shrub with spreading or drooping branchlets which are flattened at the upper extremities, unarmed. *Bark* dark-grey, brittle with vertical cracks, often warty; inside light brown, coarsely mottled with thick deep brown strands; turning dark-brown. *Leaves* bifarious, variable, 3-6 by 1-3 in., entire, elliptic or ovate-lanceolate, abruptly acuminate, coriaceous, quite glabrous, glossy; lateral nerves 3-6 on either half; nerve axils gland pitted; base rounded or cuneate, often unequal; petiole .3-.5 in. long; stipules variable, long-cuspidate. *Flowers* 5-merous, white, fragrant, in dense axillary often umbellate cymes sessile or shortly peduncled. *Calyx* truncate or obscurely toothed. *Corolla* tube campanulate; lobes lanceolate, rotate, reflexed. *Stamens* on mouth of corolla; filaments short. *Style* long; stigma mitriform. *Fruit* globose, blackish or purple, slightly longer than broad. *Pyrenes* more or less wrinkled or tubercled, rounded on the back.

SYLHET, N. C. HILLS (Jatinga); KHASI HILLS.

Wood hard, close and even grained, used to some extent for handles of implements. Gamble says that it has a great resemblance to box wood.

Flrs. 12-3. Fr. 5-8.

2. *Canthium glabrum* Bl. Vern. *Bon-theregu*, Sibsagar, *Ticho-okran-arong*, *Jhenemuiarong*, Mik.; *Bathling*, Lush.; *Bolthinking*, Garo; *Ramnissethar*, Kuki; *Bogakalti*, *Bhela*, Ass.; *Longam-chang*, Naga; *Dieng-ri-sai*, Khasi.

A middle sized tree (50'/57''), irregularly fluted, unarmed. *Branchlets* decussate and irregularly fluted; old leaves yellow. *Bark* deep-brown with white patches, corky outside, fibrous, brown and pale inside; blaze striated, red and yellow, turning dirty. *Leaves* 4-7 by 1·5-3 in., bifarious, entire, elliptic, ovate-oblong or oblong-lanceolate, obtuse to abruptly acuminate, thinly coriaceous, glabrous, glossy-green above, paler beneath; lateral nerves 5-7 on either half; nerve axils occasionally gland pitted; tertiary nerves obconic; base rounded or cuneate; petiole ·2-·5 in. long; stipules with broad base, subulate. *Flowers* pentamerous, in shortly peduncled glabrous rather lax cymes. *Calyx* glabrous, about ·5 in. long. *Corolla* tube sub-globose; lobes as long, spreading. *Stigma* mitriform, notched. *Fruit* globose; pyrenes quite smooth, triangular, almost keeled; pericarp fleshy, granular.

SIBSAGAR, LUSHAI HILLS, CACHAR, SYLHET, DARRANG, GOALPARA, GARO HILLS, KAMRUP & KHASI HILLS.

Wood yellowish white, very hard, compact.

Flrs. 7-10. Fr. 1-3.

3. *Canthium gracilipes* Kurz.

A scrambling shrub; young branchlets pubescent. *Leaves* 1-3 by ·5-1·8 in., entire, elliptic or ovate or oblong-lanceolate, acuminate, membranous, glabrous, nerves beneath sparsely puberulous; lateral nerves 5-7 on either half; base acute or rounded; petiole ·1-·2 in. long; stipules subulate, pubescent. *Flowers* small, pentamerous, solitary or in pairs on capillary pubescent pedicels arising from arrested lateral branchlets. *Calyx* glabrous; teeth subulate. *Fruit* bluish-black, slightly compressed, sinuate at the apex; albumen copious.

Garampani, Barpathar SIBSAGAR. Assam species are armed with axillary spines. Not recorded from Assam previously.

Flrs. 4. Fr. 11.

4. **Canthium angustifolium** Roxb.=C. Leschenaultii Wight et Arn. Vern. *Dieng-sia*, Khasi.

A scandent shrub armed with decussate usually opposite, axillary or supra-axillary sharp spines, sometimes slightly armed, branches divaricate. *Leaves* 1.3.6 by .4.1.3 in., entire, ovate-lanceolate, acuminate, thinly chartaceous, glabrous and glossy; base rounded; lateral nerves 4-6 on either half. *Flowers* pentamerous, dull white, .5 in. across, in axillary fascicles. *Calyx* turbinate, nearly truncate or with 5 minute teeth. *Corolla* lobes lanceolate, spreading, twisted in bud. *Style* hairy at base; stigma mitriform, bilobed. *Fruit* suborbicular, compressed. *Pyrenes* more or less wrinkled or tubercled, rounded on the back.

N. E. F. TRACT, KHASI HILLS, GARO HILLS.

Flrs. 3. Fr. 8.

5. **Canthium parvifolium** Roxb. Vern. *Sia-soh-ngian*, Khasi.

An erect rigid thorny shrub; stem cinnamon-coloured when young. *Branchlets* hispid-pubescent, long and spreading. *Leaves* .5.1.5 by .4.1.4 in., sessile or sub-sessile, yellowish-green when dry, entire, ovate-elliptic, pubescent, sub-acute, thinly chartaceous; lateral nerves 4-6 on either half, ascending, arcuate; base acute or rounded; stipules ovate-lanceolate. *Flowers* 5-merous, sub-sessile, axillary, in clusters. *Calyx* sinuately 5-toothed; teeth minute. *Corolla* sub-globose, glabrous; lobes lanceolate, acute. *Fruit* globose, .7.9 in. across. *Pyrenes* more or less tubercled, rounded on the back.

KHASI HILLS, GOALPARA.

Flrs. 3-5. Fr. Cold season.

29. VANGUERIA Juss.

Vangueria spinosa Roxb. Vern. *Mainakanta*, Beng.; *Ketkora*, Mon, Ass.; *Thitchkeong*, Garo; *Mon*, Cah.; *Misathei*, Kuki; *Haibi*, Manip.; *Soh-mon*, *Dieng-soh-myren*, Khasi; *Dieng-sa-matan*, Synt.

A deciduous shrub or small tree. *Bark* brown to deep grey with vertical cracks; blaze yellowish. *Spines* up to

·7 in. long, somewhat supra-axillary; branchlets terete. *Leaves* opposite or sometimes ternate, 1·5-5 by 1·2·75 in., entire, ovate-elliptic or elliptic-ovate, acute or bluntly acuminate, membranous, more or less glabrous; lateral nerves 6-9 on either half, curving upwards near the margin; nerve axils with tufts of hairs; base shortly cuneate; petiole ·2·5 in. long; stipules connate, cuspidate from a broad base. *Flowers* greenish white, on short peduncled cymes, which are axillary or supra-axillary or sometimes from small excrescences. *Calyx* 5-toothed. *Corolla* induplicate-valvate in bud; tube short, sub-globose; throat woolly; lobes spreading. *Stamens* sub-sessile; anthers exserted. *Ovary* 5-celled, less often 3-4-celled or 6-celled; style long; stigma lobed; ovules pendulous, solitary. *Fruit* a fleshy drupe, about 1·1·5 in. across, yellowish when ripe, with 3·5 woody pyrenes; embryo central in copious fleshy albumen.

GARO HILLS, SIBSAGAR, K. & J. HILLS, N. E. FRONTIER TRACT, KAMRUP, CACHAR, DARRANG and GOALPARA.

Fruits edible. Leaves are sometimes eaten pounded into a paste.

Flrs. 4-5. Fr. Rainy season.

30. IXORA Linn.

Shrubs or small trees. *Leaves* opposite, occasionally ternate, usually coriaceous; stipules interpetiolar, usually connate. *Flowers* usually 4-(rarely 5-) merous in terminal 3-ohotomously branched or corymbose cymes; bracts 2, coriaceous. *Calyx* tube ovoid, small; teeth persistent. *Corolla* tube slender, long; lobes usually shorter than the tube, spreading, often reflexed, twisted in bud. *Stamens* on the mouth of the corolla; filaments obsolete or very short; anthers linear, 2-fid at base, often apiculate. *Ovary* 2-celled; style filiform, exserted; stigma slender, 2 branched, fusiform; ovules solitary in each cell, peltately attached to the septum. *Fruit* globose or sub-didymous, with 2 plano-convex or ventrally concave coriaceous pyrenes. *Seeds* often 1 only (others undeveloped); testa membranous; albumen horny; cotyledons flat, thin; radicle inferior.

Calyx-teeth longer than ovary :—

Flowers in compact corymbiform cymes, usually sessile. Corolla tube slender :—

Lateral nerves conspicuous; petiole .5-1 in. long. 1. *I. acuminata*.

Lateral nerves slender and obscure; petiole .2-·6 in. long. 2. *I. subsessilis*.

Calyx-teeth as long as or shorter than ovary :—

Flowers in long pedunculate brachiate cymes; young parts pubescent; corolla lobes notched. 3. *I. villosa*.

Flowers in shortly pedunculate (less than 2 in.) cymes :—

Lateral nerves up to 14 pairs; petiole .2 in. long; corolla lobes oblong. . . 4. *I. parviflora*.

Lateral nerves 12-17 pairs; petiole .2-·6 in. long; corolla lobes linear (young parts drying black). . . . 5. *I. nigricans*.

Lateral nerves 8-10 pairs; petiole .2-·3 in. long. 6. *I. cuneifolia*.

Lateral nerves 24-30 pairs; petiole .3-·8 in. long. 7. *I. undulata*.

1. *Ixora acuminata* Roxb.

Shrub or an undershrub, branchlets ribbed or angled. *Leaves* very variable, 4-15 by 2·5-6 in., elliptic or linear-elliptic-oblong, acuminate, coriaceous, glabrous; lateral nerves 9-11 on either half; base usually connate or wedge-shaped; petiole .5-1 in. long. *Floral* pair of leaves ovate or obovate, sessile, auricled or with rounded base. *Flowers* in sessile or sub-sessile corymbose dense flowered cymes; bracteoles long. *Calyx* glabrous, reddish; teeth lanceolate, much longer than the ovary. *Corolla* white; tube very slender, up to 1·5 in. long, narrowly obovate; mouth villous and pubescent. *Anthers* sessile. *Stigma* fusiform. *Fruit* ellipsoid, up to .7 in. long.

GOALPARA, SIBSAGAR.

Flrs. 5. Fr. Autumn.

2. *Ixora subsessilis* Wall. Vern. Deing-jowat, Khasi.

A shrub or an undershrub, handsome when in flower. *Bark* greyish brown. *Branchlets* greyish-green. *Leaves* 3-6 by .5-2 in., elliptic-lanceolate, oblanceolate, sharply acuminate,

entire, subcoriaceous, shining, paler when dry; nerves slender and obscure; petiole .2-.6 in. long; stipules sheathing, long cuspidate. *Flowers* deep red (gradually getting lighter, even white), in terminal sub-sessile corymbiform cymes. *Peduncles* generally geniculate. *Calyx* bright red; segments linear, 3 or 4 times the ovary. *Corolla* very slender, .75-1.25 in. long; lobes 4, lanceolate, reflexed, acute; mouth glabrous. *Filaments* flattened; anthers slender. *Fruit* 1-2-seeded, crowned with the calyx-teeth; pyrene concave.

SIBSAGAR, CACHAR, MIKIR HILLS, LAKHIMPUR, KHASI & JAINTIA HILLS-ascending up to 4,000 ft.

Flrs. 5. (Sibsagar)-9-10. Fr. 10-12.

3. *Ixora villosa* Roxb.

A shrub. *Branchlets* pubescent or tomentose. *Leaves* very variable, 5-14 by 2.5 in., narrow or broad elliptic, caudate-acuminate, entire, thinly coriaceous, glabrous above, more or less tomentose beneath; lateral nerves 10-12 pairs; base rounded or acute; petiole short; stipules tomentose. *Flowers* white in long peduncled brachiate pubescent cymes. *Calyx-teeth* short, as long as the tube. *Corolla* glabrous; tube very slender; lobes .3-.4 in. across, notched. *Filaments* subulate; anthers slender. *Style* exserted. *Fruit* size of a pea, red, crowned by the calyx limb. *Seeds* ventrally concave.

Thariaghat (KHASI HILLS); Golaghat, (SIBSAGAR); CACHAR, Kohima Road, Fort Lungleh (up to 4,000 ft.).

Flrs. 4-6.

4. *Ixora parviflora* Vahl.

A small evergreen glabrous tree or shrub with dark-pale greyish often postulate bark; blaze flesh coloured. *Leaves* sub-sessile, 3-6 by 1.5-2.5 in., elliptic or oblong, obtuse or shortly acuminate, entire, coriaceous, dark-green and shining; lateral nerves up to 14 on either half; base rounded or cordate (Assam specimen cuneate or narrowed to the petiole); petiole up to .2 in. long; stipules cuspidate. *Flowers* white, odorous, sub-sessile, in compact 3-5 branched panicles; buds ellipsoid. *Calyx* lobes minute.

Corolla glabrous; tube $\cdot 3\text{--}\cdot 4$ in.; lobes reflexed, usually 4, sometimes 5. *Anthers* tailed. *Style* slightly hairy. *Fruit* size of a pea, reddish or black when ripe.

KHASI HILLS (Mann).

Flrs. 4-5. Fr. 7-8.

5. *Ixora nigricans* Bl. Vern. *Parsim-phoi*, Kuki.

A large evergreen shrub or a tree; stem greyish-brown. *Leaves* $3\text{--}6\cdot 5$ by $1\text{--}2$ in. (turning black in drying), lanceolate, oblanceolate, elliptic-lanceolate, acute or shortly acuminate, entire, thinly coriaceous, glabrous; lateral nerves 12-17 on either half, inconspicuous, arched; base acute or cuneate; petiole $\cdot 2\text{--}\cdot 6$ in. long; stipules cuspidate, bristly. *Flowers* white, scented, in sub-sessile or shortly peduncled brachiate cymes with 2 lanceolate foliaceous bracts at the base of the main peduncles; buds narrowly fusiform. *Calyx* glabrous; teeth triangular, acute, shorter than the ovary. *Corolla* slender, glabrous within and without. *Filaments* slender; anthers almost filiform. *Style* glabrous; stigma with recurved branches. *Fruit* size of a pea, black. *Seeds* plano-convex.

KHASI HILLS, NAGA HILLS, N. CACHAR HILLS (5,000 ft.).

Flrs. 4-5. Fr. 10-11.

6. *Ixora cuneifolia* Roxb.

An evergreen shrub. *Leaves* $6\text{--}9$ by $2\text{--}4$ in., elliptic-lanceolate or oblanceolate, shortly acuminate, entire, sub-coriaceous, glabrous above, glabrous or minutely puberulous beneath; lateral nerves 8-10 on either half, arched, terminating in intramarginal veins; petiole $\cdot 2\text{--}\cdot 3$ in. long; stipules cuspidate. *Flowers* white, about 1 in. long, sub-sessile, on short peduncled or sub-sessile cyme. *Calyx* glabrous; teeth as long as the tube. *Corolla* tube slender; lobes oblong. *Style* exserted. *Fruit* size of a pea, red ($\cdot 3\text{--}\cdot 4$ by $\cdot 2\text{--}\cdot 05$ in.). *Seeds* ventrally concave.

SYLHET (De Silva, Hooker); Duffla Hills (Lister) up to 4,500 ft.

Flrs. 4-7. Fr. Cold season.

7. *Ixora undulata* Roxb.

A large evergreen shrub or small tree (25'/10''); young parts puberulous. *Bark* grey, rough; inside light brown, turning darker. *Leaves* 3-8 by 1-2.5 in., elliptic, elliptic-lanceolate or linear-lanceolate, acute or acuminate, mostly with undulate margins, membranous, glabrous, shining; lateral nerves 24-30 on either half, arched; base acute; petiole .3-.8 in. long, channelled; stipules broadly marginate with a long cusp. *Flowers* white, scented, in corymbosely paniced lax peduncled brachiate cymes which are jointed at the ramifications; bracts and bracteoles persistent; buds slender, clavate or lanceolate. *Calyx* glabrous; segments persistent, acute, minute. *Corolla* tube slender, up to .5 in. long; lobes about as long or a little shorter, spreading, reflexed, revolute (valvate). *Filaments* slender; anthers dorsifixed. *Stigma* recurved. *Fruit* ellipsoid, succulent, purplish or blackish grey when ripe, with 2 plano-convex pyrenes.

NOWGONG, GOALPARA, KAMRUP, KHASI HILLS.
Wood hard.

Flrs. 4-5. Fr. 8-9.

31. PAVETTA Linn.

Shrubs or small trees. *Leaves* usually membranous; stipules usually connate in a loose deciduous intrapetiolar sheath. *Flowers* in terminal or axillary 2-3-chotomously branched corymbose cymes; bracteoles small. *Calyx* turbinate or campanulate, segments 4, rarely 5. *Corolla* hypocrateriform; lobes 4, rarely 5, contorted; tube slender, cylindric. *Stamens* 4, rarely 5, on the mouth of the corolla; anthers linear. *Ovary* 2-celled; style slender, long, much exserted; stigma fusiform; ovules solitary in each cell attached to the septa on a prominent placenta. *Fruit* small, baccate, fleshy with 2 ventrally concave pyrenes; testa membranous; albumen horny; embryo curved; cotyledons foliaceous; radicle inferior.

Flowers in spreading corymbose panicles.

Lateral nerves 10-15, glabrous. 1. *P. indica*.

Flowers in corymbose cymes; branches sessile.

Lateral nerves 10-15, tomentose. 2. *P. naucleiflora*.

Flowers in compact capitate cymes. Lateral
nerves 7-9. 3. *P. subcapitata*.

1. Pavetta indica Linn. Vern. *Dieng-long-tham*,
Dieng-pait-parao, *Dieng-soh-sim*, Khasi; *Kange*, Nep.;
Khamkhathek, Garo; *Gobor-hitha*, *Sam-suku*, Ass.; *Jangtar-*
long, Mik.; *Patang-asing*, N.-E. F.

A large deciduous spreading shrub or a small tree (up to 18 ft.), greyish, with slightly rough bark. *Leaves* rather variable, 3-7 by 1-3 in., elliptic-ovate or oblanceolate, obtuse, acute or acuminate, subcoriaceous, pubescent or glabrous; lateral nerves 10-15; base tapering; petiole .5-1.5 in. long; stipules with acute tip. *Flowers* white, fragrant, in terminal or lateral corymbose panicles; bracts broad, membranous. *Calyx* usually pubescent, more or less truncate or with 4 short teeth. *Corolla* salver-shaped; tube long, very slender; lobes contorted in bud. *Stamens* 4 on the mouth of the corolla; filaments short; anthers exserted; style filiform, exserted, about 1 in. beyond the mouth of the corolla; stigma not divided. *Fruit* globose, glossy, blackish-green.

NOWGONG, N. E. FRONTIER, GOALPARA, DARRANG,
CACHAR, GARO HILLS, KAMRUP, LAKHIMPUR, N. C. HILLS.

Flrs. 6. Fr. 12-1.

2. Pavetta naucleiflora Wall.

A shrub, all parts densely pubescent. *Leaves* 3-6 by 1-2 in., elliptic, broad-lanceolate or oblanceolate, entire, acuminate, subcoriaceous, more or less tomentose, more so on the nerves beneath; lateral nerves 9-10 on either half; base acute; petioles hairy, .5-1 in. long. *Flowers* white, long pedicellate on sessile corymbose cymes; branches sessile, hairy. *Calyx* tubular, pubescent; teeth subulate, small. *Corolla* white, .25-.5 in. long; tube slender; lobes oblong. *Fruit* size of a small pea, black, hispid, .25 in. across.

SYLHET (Wall Cat. 6171), KHASI HILLS, ASSAM.

Flrs. 1. Fr. Hot season.

3. Pavetta subcapitata Hook. f. Vern. *Khem-arkhu*, Kach.; *Mir-arong*, *Mirchakchu*, *Usupiban*, Mik.

A shrub. *Bark* brown. *Leaves* 2·5·5 by ·7·2 in., elliptic-lanceolate or elliptic-obovate, caudate-acuminate, entire, glabrous above, finely pubescent beneath; lateral nerves 7·9 on either half, ascending, arched at the margins; base acute or cuneate; petiole ·3·1 in. long. *Flowers* white in terminal sessile compact capitate cymes. *Calyx* puberulous; teeth very short, distinct. *Corolla* tube ·5·75 in. long. *Style* filiform, much exserted, about 1 in. beyond the mouth of the corolla. *Berry* rounded, siz of a pea.

NOWGONG, SIBSAGAR, KHASI & JAINTIA HILLS (Gomez).
Leaves are eaten.

Flrs. 5-6. Fr. Cold season.

32. COFFEA Linn.

Shrubs. *Leaves* opposite, rarely ternate; stipules free, broad. *Flowers* in exillary or terminal fascicles or solitary or axillary cymes. *Calyx* tube short; limb short, often glandular within, persistent. *Corolla* lobes 4·7, spreading, contorted in bud. *Anthers* 4·7, sessile, often recurved and twisted. *Ovary* 2-celled; style filiform, bifid at the apex; lobes linear or subulate; ovules solitary in each cell, peltate on the septum. *Drupe* with 2 plano-convex or ventrally concave coriaceous or cartilaginous pyrenes. *Seeds* concave or grooved ventrally; albumen horny; embryo short, sub-basal; cotyledons cordate, thin; radicle inferior.

Flowers in many flowered fascicles. *Corolla* tube less than ·5 in. long:—

Calyx truncate:—

Glabrous shrub or small tree. .. 1. *C. arabica*.

Calyx-teeth acute:—

Pubescent rambling or almost climbing shrub. Seeds ventrally concave. 2. *C. khasiana*.

Glabrous rambling or almost climbing shrub. Seeds plano-convex. .. 3. *C. Jenkinsii*.

Flowers solitary or in few flowered fascicles.

Corolla tube ·5 in. or longer:—

Flowers solitary or 1·3 together. *Calyx* truncate, obscurely 5-toothed. .. 4. *C. bengalensis*.

Flowers usually solitary. *Calyx* many toothed. .. 5. *C. fragrans*.

1. *Coffea arabica* Linn. Vern. *Dieng-koffi*, Khasi.

A handsome evergreen shrub or small tree with spreading branchlets. *Leaves* bifarious, 5-7 by 1·2-2·5 in., elliptic to ovate-oblong, shortly acuminate, shining, glabrous; lateral nerves 10-12 on either half, looped and with large gland pits; base narrowed into a short petiole; stipules broadly lanceolate, cuspidate. *Flowers* appearing with the leaves, sub-sessile, 1-3-nate or in axillary cymes subtended by foliaceous bracts. *Calyx* limb truncate. *Corolla* funnel-shaped. *Drupe* purple when ripe, oblong, with 2 pyrenes.

Cultivated in Mahadeo and Dawki (KHASI HILLS).

Yields the well-known coffee beans of commerce.

Flrs. 3. Fr. 12.

2. *Coffea khasiana* Hk. f. Vern. *Nreu-chiang-pui*, Naga; *Dieng-soh-ja-ryngksang*, Synt.; *Dieng-supoh-niuroi*, Khasi.

A suberect shrub (up to 9 ft. in height) with rough greyish or brown finely furrowed branches; twigs and young parts adpressed pubescent. *Leaves* 4 by 1·5 in., oblong or elliptic-lanceolate, caudate-acuminate, sinuate, glabrous above, prominent beneath; secondary nerves 6-8 on either half; tertiaries fine; petiole short, ·2-·25 in. long, stout, pilose; stipules subulate from a base ·3 in. long. *Flowers* ·25 in. long, in many flowered axillary dense much branched capitulate pubescent cymes; bracts and bracteoles opposite, connate below, triangular ovate; pedicels very small. *Calyx* ·05 in. long; teeth pliose, acute. *Corolla* green in bud, ultimately orange; tube ·2 in. long; throat villous; lobes ·05 in. long, triangular. *Stamens* at the throat of the corolla tube; filaments short. *Ovary* 2-celled with one pendulous ovule in each surmounted by an annular fleshy disk; stigma deeply bifid; lobes linear. *Drupe* globose, ·25 in. across, crowned by the persistent calyx teeth. *Seeds* ventrally concave.

KHASI & JAINTIA HILLS, MANIPUR and GOALPARA.

Flrs. 4-7. Fr. 11-2.

3. *Coffea Jenkinsii* Hk. f.

A shrub or a tree (up to 30'/35'') similar to *C. khasiana* but almost entirely glabrous. *Leaves* 4-8 by 1-2 in., variable, narrow-lanceolate to elliptic—lanceolate, entire, caudate-acuminate, membranous, glabrous above, more or less pubescent beneath specially on the nerves; lateral nerves prominent, 6-8 on either half, arcuate; base cuneate or acute; petiole .1-.3 in. long. *Flowers* in axillary fascicles; *bracts* connate into a tube at the base of the ovary. *Calyx* .2 in. long, broadly campanulate; teeth small, acute. *Corolla* 4-lobed; tube about .16 in. long with tufts of hairs in the sinuses of the lobes. *Stamens* 4. *Fruit* ellipsoid, .3 in. long. *Seeds* plano-convex without the groove.

KHASI HILLS.

Flrs. 3-4. Fr. 7-9.

4. *Coffea bengalensis* Roxb. Vern. *Khum-daude*, Mech.; *Akhaji*, *Dewamali*, *Kothnaphul*, Ass.; *Mirthelo*, *Mirherai*, *Porkanthu*, *Lekluru*, Mik.; *Khemsisa-baphang*, Kach.

A deciduous shrub, with slender spreading branches, and pale greyish-brown bark. *Leaves* variable, 2-4 by 1-2.5 in., elliptic or broadly ovate, acute or acuminate, entire, membranous, glabrous, except on the nerves beneath, dull green; lateral nerves 10-15 on either half; base narrowed into short petiole; petiole up to 1.5 in. long; stipules persistent, setaceous, stiff. *Flowers* slender, white, fragrant (appearing with the leaves, occasionally before the appearance of the new leaves), showy, 1-1.8 in. across, solitary or 1-3 together, axillary or at the ends of small branchlets. *Calyx* truncate; teeth minute. *Corolla* salver-shaped; tube short, twisted in bud. *Anthers* dorsifixed, apiculate. *Drupe* subglobose or ovoid, blackish, subdidymous. *Seeds* grooved.

KHASI HILLS, GOALPARA, KAMRUP, NOWGONG, DARRANG, SIBSAGAR, LAKHIMPUR.

The seeds are used as substitute for coffee. Often found flowering all the year round.

Flrs. 2-5. Fr. 10-12.

5. *Coffea fragrans* Wall. mss.

A deciduous shrub, stem glabrous. *Leaves* 2-4 by 1-2 in., elliptic, elliptic-lanceolate, blunt or rounded; glabrous, pale beneath; lateral nerves conspicuously raised, 4-5 on either half, slender, arched. *Flowers* fragrant, white, subsolitary, 5-merous, appearing with the leaves. *Calyx* limb many toothed. *Corolla* tube .6-1 in. long. *Drupe* didymous.

SYLHET (Gomez).

33. LEPTODERMIS Wall.***Leptodermis Griffithii* Hk. f.**

A rigid much branched shrub (8 ft.), fœtid when bruised. *Leaves* opposite, several pairs often approximate on arrested branchlets, .3-1.5 by .2-.5 in., elliptic-lanceolate, acute, entire, subcoriaceous, scaberulous above, almost glabrous beneath, but puberulous along the nerves; lateral nerves 2-3 on either half; base narrowed into the petiole; petiole up to .4 in. long; stipules persistent, small. *Flowers* usually 5-merous, white, almost sessile, terminal with a pair of connate acuminate bracts. *Calyx-teeth* nearly glabrous, lanceolate. *Corolla* funnel-shaped, pubescent outside, .6 in. long, densely white, hairy within; lobes valvate with inflexed edges. *Stamens* inserted on the corolla throat; anthers 5, oblong, sub-sessile. *Ovary* 5-celled; style slender, long, with 5 feathery arms; ovules solitary in each cell, basal, erect. *Calsule* 5-valved to the base, .15 in. long, 5 seeded. *Seeds* enveloped in a loose reticulate fibrous covering.

MANIPUR, KHASI HILLS, up to 5,000 ft.

Flrs. 6-7. Fr. Beginning of cold season.

34. PÆDERIA Linn.

Slender twining shrubs, fœtid when bruised; branches terete, flexuous; stipules intrapetiolar, triangular, deciduous. *Flowers* 4-5-merous, in axillary and terminal 2-3 chotomously branched paniced cymes. *Calyx* persistent. *Corolla* tubular or funnel-shaped, pubescent; lobes valvate in bud with inflexed crisped margins. *Anthers* sub-sessile on the corolla

tube, linear-oblong. *Ovary* 2-celled; style slender; stigmas 2, capillary twisted; ovules solitary in each cell, basal, erect. *Fruit* compressed or globose; epicarp thin, fragile, shining, separating from 2 orbicular or oblong dorsally compressed membranous or coriaceous pyrenes. *Seeds* much compressed dorsally; testa adnate to the pyrene; cotyledons large, foliaceous, thin.

Fruit much compressed; pyrenes separating from a filiform carpophore. Ripe seeds broadly winged.

1. *P. fœtida*.

Fruit subglobose; pyrenes not separating from a filiform carpophore. Ripe seeds not winged.

2. *P. tomentosa*.

1. *Pæderia fœtida* Linn. Vern. *Makunda-lot*, Sylh.; *Paduri-lata*, *Padri-lewa*, Ass.; *Madot-thi*, *Pashum*, Garo; *Doukhi-Bondung*, Mech; *Sam-khi-phu*, Kach; *wei-nam-brang*, Kuki; *Mei-in-tung*, *Mei-soh-masem*, Khasi.

A slender wiry fœtid climber, winding anti-clock-wise. *Leaves* opposite, 2·5·5 by ·6·2·5 in., elliptic-ovate, oblong-ovate or lanceolate, shortly acuminate, entire, membranous, glabrous; lateral nerves 5-7 on either half; nerve axils often hairy; base rounded or sub-cordate; petiole 1-3 in. long. *Flowers* greyish purple, with reddish purple mouth, in axillary and terminal cymose panicles; cyme branches opposite. *Calyx* teeth small, usually triangular. *Corolla* funnel-shaped; tube glandular hairy within. *Fruit* ellipsoid, reddish, compressed; pyrenes with a board wing.

N. E. FRONTIER, N. C. HILLS, CACHAR, SYLHET, NOWGONG, DARRANG, KAMRUP, GOALPARA, GARO HILLS, KHASI HILLS.

The decoction prepared from the leaves is considered wholesome and nutritive. The whole plant is regarded as a specific for rheumatic affections. The juice of the leaves is astringent and is a specific for diarrhœa and dysentery.

Flrs. 7-10. Fr. Cold season.

2. *Pæderia tomentosa* Bl. Vern. *Bud-in-tung*, Khasi; *Buking-bepuk*, Miri; *Doukhi-bondung*, Mech; *Oasibu*, Mik.

A slender climber. *Leaves* opposite, 2·4·5 by 1·2·5 in., ovate to ovate-lanceolate, acute or acuminate, entire, membranous; usually glabrous, sparsely pubescent or

subtomentose; base usually subcordate; petiole .5-2.5 in. long. *Panicles* often scorpioid. *Calyx* small. *Corolla* scurfy-tomentose or velvety. *Fruit* subglobose, ripening yellowish-brown; pyrenes 2, orbicular, much compressed.

N.-E. FRONTIER TRACT, DARRANG, SIBSAGAR, KAMRUP, GOALPARA, KHASI HILLS, up to 6,000 ft.

Flrs. 7. Fr. Cold season.

***Pæderia Cruddasiana* Prain.**

A climber. *Leaves* 2.5 by 1-2.5 in., opposite, ovate, acute; base truncate. *Petiole* 1-1.25 poll long. *Flowers* in axillary or terminal paniculate cymes; bracteoles subulate. *Calyx* segments 5, short, triangular; tube campanulate. *Corolla* puberulous outside, densely tomentose inside. *Fruit* .25 by .3 in., egg-shaped, uncompressed, narrowed upwards from the middle.

LUSHAI HILLS, GARO HILLS.

35. MORINDA Linn.

Erect or climbing shrubs or trees. *Leaves* opposite, rarely ternate; stipules connate, sheathing. *Flowers* white, axillary or terminal in simple or paniced or umbellate peduncled heads; the calyces more or less connate. *Calyx-tube* short; limb truncate, obscurely toothed. *Corolla* lobes 4-7, coriaceous valvate. *Stamens* 4-7; filaments short; anthers linear and oblong. *Ovary* 2 or sometimes spuriously 4-celled; style slender with 2 stigmatic lobes; ovules solitary, ascending from a sub-basal placenta on the septum. *Fruit* a syncarpium formed by the succulent enlarged calyces enclosing many- 1-seeded pyrenes, sometimes cohering in a 2-4-celled putamen or occasionally nearly free drupels. *Seeds* obovoid or reniform; testa membranous; albumen fleshy or horny; radicle inferior.

Corolla 5-7-merous, tube up to 1 in. long.

Leaves 4-15 in. long. 1. *M. angustifolia*.

Corolla 4- (rarely 5-) merous; tube less than .5 in. long :—

Diffuse climbing shrub; branches usually glabrous. Syncarpium irregularly lobed, .25 in. across. 2

Climbing shrub, more or less hirsute. 2 *M. umbellata*.

Syncarpium deep orange, .8 in. across. 3. *M. villosa*.

1. *Morinda angustifolia* Roxb. Vern. *Dieg-nong*, *Dieng-siroi*, *Dieng-shongrei*, Khasi; *Asu-goch*, *Asu*, *Akalbih*, Ass.; *Changmi-rongbi*, Duff.; *Kechan-bophang*, *Cheng-long-phang*, *Jeng-long-phang*, Kach.; *Jang-tarlong*, *Tarlong-arong*, Mik.; *Ralum*, Tipp.; *Holdiruk*, Sylh.; *Asou*, *Asou-biphang*, Mech.; *Chhennong*, *Chhengrong*, Garo; *Asu*, Jharua.

A large shrub (18'/12'') or a small tree. *Bark* greyish, exfoliating in thin pieces; blaze whitish. *Leaves* 4-15 by 1.5-5.5 in. long, narrow-lanceolate or oblanceolate, entire, long acuminate, membranous, more or less puberulous, but upper surface glabrescent with age; hairs branched on the nerves beneath; lateral nerves 10-15 on either half, looped within the margin; tertiaries prominent, oblique; petiole .2-1.5 in. long; stipules acute. *Flowers* fragrant, usually 5-merous, in axillary on leaf opposed pedunculate globose heads, ultimately elongating in fruit. *Calyx* nearly truncate or obscurely toothed. *Corolla* salver-shaped; tube up to 1 in. long. *Fruit* turbinate, not confluent, almost white, structure of the pyrene is characteristic.

SYLHET, KAMRUP, GOALPARA, GARO HILLS, SIBSAGAR, LAKHIMPUR, DARRANG and KHASI & JAINTIA HILLS, ascending up to 4,000 ft.

The root is used for dyeing.

Flrs. 1-5. Fr. 6-9.

2. *Morinda umbellata* Linn.

A diffuse shrub with long switchy climbing branchlets; internodes of young shoots long. *Leaves* variable, 2.5-5.5 by .8-2 in., elliptic, oblong or lanceolate, sometimes obovate, acuminate, entire, membranous, usually glabrous; lateral nerves 6-8 on either half; base acute; petiole .3-.5 in. long; stipules sheathing. *Flowers* heads in terminal umbels. *Peduncles* sparingly pubescent. *Calyx* limb a mere rim only, truncate. *Corolla* tube short, hairy within. *Syncarpium* irregularly lobed, .25 in. across; pyrenes pyriform. *Seeds* not winged.

KHASI HILLS (up to 4,000 ft.).

Flrs. 9. Fr. 10-11.

3. *Morinda villosa* Hk. f.

A climbing shrub. *Branches* more or less hirsute, longitudinally ribbed. *Leaves* 1·5-4 by 1-1·8 in., elliptic-obovate or elliptic-lanceolate, acuminate, entire, membranous, pubescent above, hirsute beneath, pale greenish when dry; lateral nerves prominent, 10-15 on either half; base narrowed into the petiole. *Flowers* usually 4-5-merous in terminal long pedunculate umbels. *Corolla* short. *Drupe*s confluent. *Syncarpium* deep orange, ·8 in across.

KHASI HILLS, CACHAR.

Flrs. 4-5. Fr. 9-10.

36. DAMNACANTHUS Gærtn.

Damnacanthus indicus Gærtn.

A small rigid spinous shrub or undershrub with spreading braches; stem pubescent. *Spines* stipulary, ·5-1·3 in. long, slender, sharp, brown. *Leaves* ·5-1·8 by ·4-·8 in., sub-sessile, ovate, sharply acute, entire, glabrous, rounded at the base; lateral nerves about 3 on either half, obscure. *Flowers* 4-5-merous, bracteate, white, about ·1 in. long, axillary, solitary or in pairs. *Calyx-tube* conical, ribbed; teeth triangular. *Corolla* funnel-shaped; throat bearded; lobes triangular-ovate, valvate in bud. *Stamens* on throat of corolla; filaments short; anthers exserted, connective broad. *Ovary* 2-4-celled; style filiform; stigma cleft; ovules solitary in each cell. *Drupe* globose, size of a small pea with 1-2 (?) plano-convex pyrenes; albumen copious, horny.

MISHMI HILLS, KHASI HILLS (Mawphlong—U. Kanjilal). Alt. 6,000 ft.

Fr. 9.

37. PRISMATOMERIS Thwaites.

Prismatomeris albidiflora Thw. Vern. *Dieng-soh-sri*, Kh.; *Khabanpelie*, Lushai; *Ramkha*, Tipp.; *Khemdoudi*, *Rammali*, Kuki; *Jangtarlong*, Mik.

A large evergreen shrub (10'/15'') with tetragonous compound divaricating branchlets. *Bark* yellowish grey; blaze white. *Leaves* 2-5 by ·7-2 in., lanceolate to elliptic-

lanceolate, entire, acuminate, coriaceous; lateral nerves slender, 6-9 on either half; base narrowed into the petiole; petiole .2-.5 in. long; stipules cuspidate. *Flowers* 4-5-merous, whitish, fragrant, unisexual, in axillary fasciculate cymes, occasionally in pedunculate umbels supported by leaf like bracts; pedicels long, filiform. *Calyx* cup-shaped, almost truncate; teeth very small. *Corolla* tube 1 in long, cylindric; lobes .3 in., valvate in bud, pubescent; throat minutely pubescent. *Stamens* on the throat of the corolla tube; filaments short; anthers linear, included. *Ovary* 2-celled; ovules solitary, pendulous; style linear; stigma 2-cleft. *Fruit* globose, .25 in. across, purplish black when ripe, 1-2-celled, 1-2-seeded. *Seeds* ventrally excavated; testa membranous; embryo lateral; albumen horny; cotyledons reinform; radicle inferior.

SIBSAGAR, GOALPARA, NOWGONG, N. C. HILLS, SYLHET, LUSHAI HILLS, KHASI HILLS, ascending up to 4,000 ft.

Wood cream coloured. Juice of leaves is used for stomach ache.

Flrs. 5. Fr. 10-1.

38. PSYCHOTRIA Linn.

Shrubs or small trees, rarely herbs, erect or occasionally climbing. *Leaves* opposite, rarely whorled; nerve axils often pitted; stipules intra-petiolar, sometimes connate, often with axillary glandular hairs. *Flowers* in terminal cymes, heads or fascicles (rarely axillary). *Calyx-teeth* short; limb deciduous or persistent. *Corolla-tube* short, straight; throat usually hairy; lobes 5, rarely 4 or 6, valvate in bud. *Stamens* equalling corolla lobes, inserted at the mouth or throat of the corolla; anthers oblong or linear, included or exserted. *Ovary* 2-celled; ovules solitary in each cell, basal, erect, anatropous; style short with 2 branched stigma. *Fruit* a drupe with 2 plano-convex pyrenes, smooth or furrowed; each 1-seeded. *Seeds* plano-convex, ventrally flat or grooved; testa thin; albumen hard, sometimes ruminant; embryo small; cotyledons leafy; radicle inferior.

Pyrenes plano-convex, no dorsal ridges, no ventral groove. Cyme-branches opposite. .. 1. *P. adenophylla*.

Pyrenes plano-convex, dorsal ridges absent or obscure with frequently a T-shaped ventral groove :—

Intramarginal nerves conspicuous :—

Calyx-teeth linear, ciliate :—

Cymes small, axillary or terminal,
short peduncled. 2.

P. calocarpa.

Calyx-teeth short, triangular :—

Cymes trichotomous, long pedun-
cled, terminal. 3.

P. Thomsonii.

Intramarginal nerves not conspicuous :—

Cymes long peduncled, corymbiform :—

Calyx obscure. Corolla throat
villous. 4.

P. denticulata.

Calyx obconic. Corolla throat
bearded with long stiff hairs. .. 5.

P. silhetensis.

Cymes sessile or short peduncled, sub-
corymbiform :—

Corolla .1 in. long. Fruit red,
.25 in across. 6.

P. montana.

Pyrenes with 4 sharp dorsal ridges :—

Leaves membranous; lateral nerves
10-14. 7.

P. erratica.

Leaves chartaceous; lateral nerves
14-18. 8.

P. fulva.

Pyrenes with 1 sharp dorsal ridge. Calyx-
teeth obscure. 9.

P. symplocifolia.

1. *Psychotria adenophylla* Wall. Vern. *Dieng-lathyllong-khlo*, *Dieng-mynro-saliang*, Synt.

An evergreen glabrous shrub. *Leaves* turning yellowish when dry, 3-6 by 1-2 in., elliptic, elliptic-lanceolate or obovate-oblong, entire, coriaceous, bluntly acuminate, glabrous; lateral nerves 12-16 on either half, pale yellow, prominent on lower surface with granular pits at the axils; petiole .2-.3 in. long; stipules at base of inflorescence almost tubular, truncate. *Flowers* small, whitish, pedicellate or sub-sessile, in usually terminal pedunculate racimiform elongate cymes; branches of inflorescence opposite, short; bracts caducous. *Calyx* almost truncate; teeth obscure. *Corolla* lobes valvate in bud; throat bearded with a dense fringe of white hairs arching over the ovary. *Fruit* ovoid, .25-.3 in. across, purplish black when ripe; pyrenes plano-convex; albumen ruminated.

N. C. HILLS, K. & J. HILLS, ascending up to 4,000 ft.

Flrs. 5. Fr. 10-11.

2. Psychotria calocarpa Kurz.=P. Viridiflora Reinw.

An evergreen semi-herbaceous undershrub (about 6 ft. high); young parts puberulous. *Leaves* variable, 4-10 by 1.5-4 in., elliptic-lanceolate, obovate or ovate-oblong usually entire acuminate, thinly coriaceous, ultimately glabrate above, puberulous beneath with cristate hairs; lateral nerves 11-13 on either half, prominent, arcuate at the margin, subparallel; base narrowed into the petiole; petiole .5-1.5 in. long; stipules 2 cleft, caducous, hyaline. *Flowers* whitish-yellowish, in axillary terminal peduncled umbellate cymes. *Calyx* teeth 4, ciliate. *Corolla* white; throat villous; tube short. *Fruit* yellow when ripe, ultimately turning red; pyrenes obscurely 4 ribbed dorsally.

SIBSAGAR, CACHAR, N.-E. F. TRACT, NAGA HILLS, LUSHAI HILLS, KHASI HILLS, ascending to 4,000 ft.

Flrs. 5. Fr. 10-12.

2. Psychotria Thomsonii Hk. f.

A small evergreen semi-herbaceous bush; stem whitish. *Leaves* 4-6 in. long, narrow-elliptic, serrulate, acuminate, subcoriaceous, glabrous but pubescent along midrib; lateral nerves strong, joined by a prominent intermarginal vein; base cuneate; petiole .3-.6 in. long; stipules .4-.6 in. long, ovate, membranous. *Inflorescence* terminal. *Fruit* ellipsoid, pointed at both ends, .5 by .2 in.

KHASI HILLS, NAGA HILLS, ascending up to 5,500 ft.

Fr. 9-10.

4. Psychotria denticulata Wall.

A shrub up to 8 ft. high with thick subherbaceous branchlets. *Leaves* 4-9 by 3.5 in., slate coloured when dry, broadly elliptic, obovate or oblanceolate, shortly acuminate, entire, coriaceous, glabrescent above, more or less puberulous beneath; main lateral nerves about 15 on either half, arcuate; intramarginal veins faint; pits on the nerve axils minute or absent; base attenuate; petiole .5-1 in. long; stipules large, membranous, broad with 2 cuspidate tips. *Flowers* greenish, in long peduncled terminal or axillary pubescent corymbiform cymes; peduncle 2-6 in. long, gene-

rally flattened. *Calyx* teeth obscure. *Corolla* tubular; tips of lobes incurved, slightly imbricate in bud; throat villous. *Fruit* globose (·2 in. across), size of a small pea; pyrenes plano-convex, smooth.

KAMRUP, KHASI HILLS.

Flrs. 5-9. Fr. 12-1.

5. *Psychotria silhetensis* Hk. f. Vern. *Soh-um*, Khasi.

A shrub with short branches. *Leaves* 4-10 by 4-6 in., elliptic, oblong-elliptic, entire, shortly acuminate, coriaceous with a velvety sheen above, glabrate or sparingly puberulous beneath; lateral nerves prominent, sub-parallel, 14-18 on either half; base cuneate, terminating in a stout petiole; petiole ·5-1·25 in. long. *Flowers* in axillary or terminal pedunculate more or less pubescent cymes. *Calyx* obconic. *Corolla* tube short, throat bearded with erect hairs. *Fruit* globose or ellipsoid, ·3-·5 in. across; pyrenes with a deep T-shaped ventral groove on back; albumen uniform.

LAKHIMPUR, SIBSAGAR, KHASI HILLS, ascending up to 4,000 ft.

Flrs. 4. Fr. 11-1.

6. *Psychotria montana* Bl.

A small evergreen glabrous shrub. *Leaves* 3-8 by 1-3 in., elliptic or oblong-lanceolate, acuminate, membranous, glabrous; lateral nerves slender, 7-9 on either half, arcuate; base tapering in a slender petiole ·5-1·5 in. long. *Flowers* whitish, in terminal or axillary subcorymbiform cymes. *Calyx* obscurely toothed. *Corolla* tube elongate; throat bearded. *Fruit* ovoid-oblong, ·3-·5 in. long, red; pyrenes plano-convex, scarcely ridged on the back; albumen uniform.

GOALPARA to SADIYA, SYLHET, SIBSAGAR, KHASI HILLS, ascending up to 2,500 ft. .

Flrs. 5. Fr. 2.

7. *Psychotria erratica* Hk. f. Vern. *Thingpispu*. *Jogwansoh-arong*, *Chehogwai-arong*, Mik.

An evergreen erect shrub. *Bark* greyish, smooth, thin; blaze light red. *Leaves* 2·5-7·5 by 1-2·5 in., lanceolate,

elliptic-lanceolate, entire, acuminate, membranous, glabrous; lateral nerves slender, 10-14 on either half; base narrowed into the petiole; petiole $\cdot 3\text{--}\cdot 7$ in. long; stipules usually 2-cleft, recurved. *Flowers* in sessile, terminal or axillary cymes, trichotomously branched; bracts lanceolate. *Calyx* teeth longer than the tube. *Corolla* tube short, hairy within. *Fruit* succulent, up to $\cdot 25$ in. across, globose, reddish-yellow; pyrenes with 4 dorsal ridges. *Seeds* undulated.

SIBSAGAR, LAKHIMPUR, N. C. HILLS, KHASI HILLS, ascending up to 5,000 ft.

Flrs. 4-6. Fr. 11-1.

8. *Psychotria fulva* Ham. Vern. *Ja-lai*, Khasi.

A shrub or an undershrub, lower part of stem grey, upper green. *Leaves* decussate, $4\cdot 5\text{--}10\cdot 5$ by $2\cdot 5\text{--}5$ in., soft, elliptic, ovate, oblong or obovate, oblanceolate, acuminate, entire, chartaceous, glabrous, somewhat glabrescent beneath; lateral nerves 14-18, subparallel, prominent below, petiole $\cdot 3\text{--}1$ in. long, stipules bifid. *Flowers* in axillary or subterminal compact usually peduncled capitate cymes: *Calyx* teeth persistent, lanceolate. *Corolla* tube short; throat villous. *Fruit* elongate, ellipsoid or ovoid, yellow when ripening and then turning tan-red; pyrenes dorsally 4-ridged.

CACHAR, MANIPUR, KHASI HILLS ascending up to 4,000 ft.

Flrs. 1. Fr. 12.

9. *Psychotria symplocifolia* Kurz.

An evergreen shrub 8-10 ft.; stem grey. *Leaves* turning yellowish when dry, $2\cdot 5$ by $\cdot 5\text{--}1\cdot 5$ in., elliptic, lanceolate or elliptic-obovate, entire, caudate-acuminate, coriaceous, glabrous, somewhat glauscescent; lateral nerves 10 on either half, rather slender, gland pitted, mainly at the axils of the nerves; petiole $\cdot 1\text{--}\cdot 4$ in. long; stipules obovate, $\cdot 25$ in. long, with a long slender and subulate tip. *Flowers* in terminal (rarely axillary) peduncled trichotomous cymes; branches slender, $1\cdot 5\text{--}2\cdot 25$ in. long. *Calyx* teeth obscure. *Corolla* tube short; throat villous. *Fruit* black when ripe,

4-gonous when dry; pyrenes plano-convex with one sharp dorsal ridge; albumen uniform.

KHASI & JAINTIA HILLS, ascending up to 6,000 ft.

Flrs. probably rainy season. (?) Fr. 10-12.

Psychotria subintegra Hk. f.=*Grumilea subintegra* W. & A. 432. A large shrub, glabrous. *Leaves* 4-6 by 1.5-2 in., elliptic-lanceolate, bluntly acute or obtuse, membranous, glabrous; lateral nerves 6-8 on either half; base acute; petiole 1-1.5 in. long; stipules broad, caducous. *Flowers* in pedunculate corymbiform cymes; lower pair of cyme branches long-spreading; flowers capitate in ultimate branches. *Calyx-teeth* short. *Corolla-tube* funnel-shaped; mouth villous. *Fruit* globose, smooth, .2 in. across.

LAKHIMPUR (Jeypore).

Flrs. Hot season. Fr. 7.

39. CHASALIA Comms.

Shrubs or small trees. *Leaves* usually membranous and glabrous; stipules bld. *Flowers* in terminal cymes; bracts and bracteoles small. *Flowers* small, white or pinkish. *Calyx* small, campanulate; tube ovoid or sub-globose; teeth 5, short. *Corolla* long, tubular, slender, usually curved; lobes 5, short. *Stamens* 5, subsessile in the corolla tube. *Disc* large. *Ovary* 2-celled; ovule 1 in each cell, erect; style bifid. *Fruit* dry or slightly fleshy, of 2 ventrally grooved pyrenes. *Seeds* orbicular, ventrally concave; testa membranous; albumen horny; cotyledons broad; radicle inferior.

Corolla 1 in. long; petiole .5-1.3 in. Fruit
.5 in. across.

1. *C. ambigua*.

Corolla .7 in. long; petiole .4-.9 in. Fruit
.2 in. across.

2. *C. sp.*

1. Chasalia ambigua W et A=*Chasalia curviflora* Thw. Vern. *Lamlopinemtu*, Mik.; *Titahukuta*, Ass.

A shrub (up to 8 ft. high); young part succulent or subherbaceous. *Bark* grey, thin, smooth; blaze white. *Leaves* variable, 5-11 in., elliptic-obovate or oblanceolate, shortly acute or acuminate, occasionally caudate-acuminate, with obscurely recurved margins, membranous, glabrous;

lateral nerves 7-11 on either half, subparallel, arcuate at the margin; tertiaries obscure; base narrowed into the petiole; petiole .5-1.3 in. long; stipules variable, usually bifid. *Flowers* white, tipped pinkish, in trichotomously branched peduncled cymes, dimorphic, (anthers exserted; stigma included or the reverse). *Calyx* minute, blackish. *Corolla* 1 in. long; tube slender, curved, white with a dash of pink at the extremity of the lobes; throat yellow, hairy inside; disc prominent. *Fruit* .5 in. across, subglobose, more or less didymous, purplish black; pyrenes dorsally compressed.

SIBSAGAR, GOALPARA, NOWGONG, DARRANG, LAKHIMPUR, KHASI HILLS, ascending up to 5,000 ft.

Flrs. 4-5. Fr. Cold season.

2. *Chasalia* sp. novo ?

A shrub about 18 ft. high. *Leaves* 4-8 by 1.5-4 in., elliptic or broadly obovate, entire, abruptly acuminate, rather membranous, glabrous; lateral nerves 6-10 on either half, arcuate; base narrowed into the petiole or cuneate; petiole .4-.9 in. long. *Flowers* more or less pinkish, in terminal short branched cymes. *Calyx* small; teeth ovate-acute. *Corolla-tube* .7 in. long. *Fruit* globose, blackish, .2 in. across.

SIBSAGAR, NAGA HILLS, KHASI HILLS, ascending up to 4,000 ft.

Flrs. 5-6. Fr. Rainy season.

The above is described from sheets marked *C. assamica* in the herbarium of the Royal Botanic Garden, Sibpur. It appears to be a variety of *C. ambigua* W. et A.

Chasalia lushaiensis Fischer. Vern. Ampangtham, Garo.

A small tree; branches round, fistulous. *Leaves* 4.8-12 by 1.2-2.8 in., opposite, elliptic-lanceolate or falcate-acuminate, membranous, glabrous; nerves prominent; lateral nerves 20 on either half, obscure above, prominent below; attenuate at base; petiole .2-1 in. long; stipules conjoint, caducous. *Cymes* densely flowered, pendunculate, glabrous, in terminal panicles; bracts cuspidate, ovate, 2.8 in. long, bracteole clavate or ciliate; buds narrow clavate, 5 costate, upto .4 in. long. *Calyx* cupular; segments 5, triangular, acute, whitish red at the apex. *Stamens* 5, inserted in the middle of corolla tube; filaments short, subulate; anthers linear, bilobed at base, dorsifixed. *Ovary*

truncate, conical, apex concave, 2-locular; style filiform; stigma 2, elongate, subulate. *Fruit* sub-globose, more or less didymous, smooth, black.

LUSHAI HILLS 200 ft. (Mrs. Parry 180). GARO HILLS, 4,000 ft. (Mrs. Parry 790, 792).

The original name was *Gærtnaria lushaiensis*—Fischer (Loganiaceæ) but now transferred to Rubiaceæ and as *C. lushaiensis*—Fischer (Kew Bull., 1932).

Fr. 10.

40. SAPROSMA Blume.

Saprosma ternatum Hk. f. Vern. *Bhedeli*, Ass.; *Thing-we-namjai*, Kuki; *Thaibreng-jola*, Kach.; *Dieng-so-eit-nai*, Khasi.

An evergreen shrub or small tree (26'/6''), all parts glabrous, branchlets angled. *Bark* greyish-brown having minute vertical fissures, .25 in. thick, brown below the cuticle; blaze cream colour. *Leaves* usually ternately whorled, with fœtid smell, coriaceous, glabrous on both surfaces, sparingly scaberulous beneath on the nerves and occasionally on the midrib; lateral nerves 7-8 on either half; tertiaries subparallel, transverse; base acute; petiole .2-.5 in. long; stipules very long, lanceolate with needle-like points, deciduous. *Flowers* white, in trichotomous or corymbosely fasciculate cymes. *Calyx* truncate or 4-6 toothed. *Corolla* funnel-shaped; lobes 4, valvate in bud. *Stamens* as many as corolla lobes, on the throat of the corolla; anthers subsessile. *Ovary* 2-celled; style filiform; stigmatic arms 2, linear. *Fruit* black when ripe, succulent, crowned by the conical disc, girted by the calyx-teeth, 1-seeded, very rarely 2.

LAKHIMPUR, SIBSAGAR, KAMRUP, CACHAR, N. C. HILLS, KHASI & JAINTIA HILLS, ascending up to 4,000 ft.

Flrs. 5-7. Fr. Cold season.

41. LASIANTHUS Jack.

Shrubs, often fœtid. *Branches* terete, compressed at the nodes. *Leaves* distichous with arching nerves and close-set tertiaries; stipules usually broad. *Flowers* small in axillary, rarely peduncled, often bracteate clusters, cymes or heads.

Calyx-tube short, 3-7 toothed, persistent. *Corolla* funnel or salver-shaped, lobes 3-7, valvate; throat villous. *Stamens* 4-6 on throat of corolla; filaments short; anthers included, often apiculate. *Ovary* 4-9 celled; style short; stigma 3-9 armed, short; ovules solitary in each cell, erect. *Drupe* small with 3-9 triquetrous 1-seeded pyrenes; testa membranous; albumen fleshy; embryo terete; radicle inferior.

Cymes sessile or nearly so, axillary; bracts conspicuous :—

Outer bracts exceeding the flower :—

Bracts ovate, .5-2 in. long, Corolla tube .16 in., yellowish white. .. 1. *L. cyanocarpus*.

Bracts subulate, .25-.5 in. long. Corolla .7 in. long. .. 2. *L. sikkimensis*.

Bracts .5-1 in. long, subulate. Corolla tube .16 in. long, white. .. 3. *L. Wallichii*.

Bracts .3-.7 in. long, subulate, filiform, hispid. Corolla tube .6 in. long. .. 4. *L. tentaculatus*.

Outer bracts much shorter than flowers :—

Bracts orbicular, coriaceous. .. 5. *L. tubiferus*.

Cymes sessile or nearly so, axillary; bracts obscure or 0 :—

Calyx toothed :—

Segments elongate, lanceolate :—

Fruit .25 in. across; pyrenes 5 (4 Hooker). .. 6. *L. lucidus*.

Fruit .16 in. across; pyrenes 6. .. 7. *L. Hookeri*.

Segments minute (subulate or triangular) :—

Calyx glabrous. Corolla about .25 in.; leaves smaller. .. 8. *L. inconspicuus*.

Calyx puberulous. Corolla about .5 in.; leaves larger. .. 9. *L. lancifolius*.

Cymes peduncled :—

Lateral nerves 8-11 on either half. Fruit .25 in. across; pyrenes 4. .. 10. *L. longicauda*.

Lateral nerves 5-7 on either half. Fruit .5 in. across; pyrenes 6. .. 11. *L. Biermanni*.

1. *Lasianthus cyanocarpus* Jack.

An evergreen shrub up to 12 ft. high; stem dark-grey; blaze light brown, all young parts rusty hirsute. *Leaves* 3.5-10 by 1.2-5 in., elliptic, lanceolate-oblong or lanceolate,

long acuminate, entire, thinly coriaceous, more or less glabrate above, brown hirsute beneath, specially on the nerves, base acute or rounded, occasionally oblique or unequal; petiole hirsute, .2-.5 in. long; stipules acute, hirsute, deciduous. *Flowers* sessile, whitish in axillary sessile clustered cymes. *Bracts* conspicuous, outer bracts ovate-lanceolate, exceeding the flowers. *Calyx* hirsute, linear. *Corolla-tube* hispid, yellowish. *Fruit* sub-globose, azure blue, up to .25 in., 4 lobed; pyrenes 4-5.

KHASI & JAINTIA HILLS, CACHAR, NAGA HILLS, SYLHET.
Flrs. 6-7. Fr. 9-11.

2. *Lasianthus sikkimensis* Hook. f.

A shrub; young parts tomentose. *Leaves* 4-8 by 1.2-2.5 in., narrow-lanceolate or elliptic-lanceolate, long acuminate, entire, coriaceous, glabrous above, tomentose beneath; lateral nerves 7-9 on either half, prominent beneath; base acute; petiole .25-.5 in. long. *Flowers* white; bracts subulate. *Calyx-teeth* 5, narrow-lanceolate. *Corolla* .7 in. long. *Drupe* light blue, about .16 in. across, sub-globose, almost glabrous; pyrenes 5.

KHASI and JAINTIA HILLS (Brandis).
Digboi, LAKHIMPUR (Dipterocarp forests 14067).

3. *Lasianthus Wallichii* Wight.

An evergreen slender undershrub. *Branches*, petioles and underside of leaves generally rusty tomentose. *Leaves* 2-5 by 1-1.5 in., lanceolate, entire, cuspidate-acuminate, ciliate, chartaceous, glabrous and shining above; lateral nerves 6-7 on either half, much arched, secondary sub-parallel, irregularly transverse; base rounded, short, often unequal, short petioled; stipules linear-lanceolate. *Flowers* .7 in. long, sessile, bracteate, axillary, fascicled; bracts linear, subulate. *Calyx* hirsute, lobes lanceolate-subulate. *Corolla-tube* slender, hairy; lobes spreading. *Fruit* "bright peacock blue, .33 in. long, not quite so broad."—C. G. Rogers. *Pyrenes* 5 (Hooker), 4-6 (Haines).

SYLHET, Wallich ! ASSAM, Jenkins !

Flrs. 4.

4. *Lasianthus tentaculatus* Hk. f.

Shrubby, glabrous. *Leaves* inequilateral, 5-7 by 2-2·5 in., oblong or obovate-oblong, abruptly acuminate, membranous, shining above, minutely hairy beneath; lateral nerves about 9 on either half, base rounded or acute; petiole ·1 in. long, hispid; stipules hispid, lanceolate, subulate. *Flowers* sessile; bracts hispid, subulate or filiform, rigid. *Calyx* small, segments linear, hispid. *Corolla* tube ·6 in. long, narrow hispid. *Fruit* not known.

SYLHET (Wallich). (*F. B. I.* Vol. III. P. 181).

5. *Lasianthus tubiferus* Hk. f.

A shrub (up to 12 ft.); stem closely brown; felted. *Leaves* 4-6·5 by 1·2-2·5 in., elliptic or lanceolate, occasionally acuminate, undulate, subcoriaceous, rough with minute short hairs underneath; lateral nerves 5-6 on either half, tertiaries raised above, conspicuous, sub-parallel in the uppermost pair; base narrowed into the petiole; petiole ·3-·5 in. long. *Flowers* sessile, in axillary clusters. *Bracts* orbicular, about ·16 in. broad, shining inside. *Corolla-tube* longer than the calyx, throat villous. *Fruit* ·3-·5 in. long, brownish when ripe with yellow juice; pyrenes 5, yellow.

KHASI & JAINTIA HILLS, ascending up to 5,000 ft.

Flrs. 5-6. Fr. 11.

6. *Lasianthus lucidus* Blume.

An evergreen erect shrub up to 10 ft. *Branches* and branchlets green. *Bark* brown; blaze reddish. *Leaves* 2-farious, 2-5 by 1-1·7 in., elliptic-ovate or lanceolate, entire, caudate-acuminate, membranous, glabrous above, strigose along nerves beneath; lateral nerves 5-7 on either half, very oblique, arched; base acute or obtuse, occasionally oblique; stipules minute. *Flowers* white, ·3-·4 in. long, sessile or sub-sessile in axillary sessile cymes. *Calyx* cup-shaped as broad as long; teeth lanceolate. *Corolla* tubular, densely woolly inside, pubescent outside. *Fruit* torquoise blue, about ·25 in. across, crowned by the calyx-teeth; pyrenes 5 (4 Hooker).

DARRANG, LAKHIMPUR, SIBSAGAR, KHASI HILLS, ascending up to 6,000 ft.

Flrs. 3-5. Fr. Cold season.

7. *Lasianthus Hookeri Clarke*.

An erect shrub with horizontal branches; young parts minutely strigose. *Leaves* 3-8 by .7-2 in., bifarious, elliptic to oblong-lanceolate, caudate-acuminate, margin ciliate, obscurely undulate, chartaceous, shining, glabrous above, strigose below, specially on the nerves; lateral nerves 5-7 on either half, very slanting, tertiaries strongly transverse to the midrib; base acute; petiole .2-.3 in. long. *Flowers* sessile, white, ebracteate in axillary clustered cymes. *Calyx* teeth lanceolate. *Corolla-tube* hairy. *Fruit* .16 in. across, blue when ripe, crowned by the calyx-teeth; pyrenes 6.

KHASI & JAINTIA HILLS, up to 4,000 ft.

Flrs. 9-5. Fr. Cold season.

8. *Lasianthus inconspicuus Hk. f.*

Shrub, glabrous. *Leaves* 3.5-5 by 1.25-1.75 in., elliptic, caudate-acuminate, opaque above; lateral nerves 5-6 on either half, rather obscure above, more distinct beneath; base acute; petiole slender, .25 in. long, puberulous; stipules small, triangular. *Flowers* in pubescent axillary clusters. *Calyx* glabrous; segments 5, triangular, acute. *Corolla-tube* slender, pubescent. *Drupe* globose, .06 in. across, smooth, crowned by the calyx-teeth; pyrenes 4-5.

SYLHET (Wallich). (*F. B. I.* Vol. III. P. 187).

9. *Lasianthus lancifolius Hk. f.*

A shrub (5 ft.). *Branches* green. *Petiole*, midrib and nerves grey-puberulous. *Leaves* 1.5-4 by .5-1.3 in., lanceolate to narrow oblong-lanceolate, entire, long acuminate, membranous, glabrous and shining above; lateral nerves 3-5 on either half, arcuate, conspicuous; base acute; stipules narrowly triangular, villous. *Flowers* sessile, white, ebracteate in axillary clusters. *Calyx* teeth subulate or lanceolate, persistent, rather shorter than or as long as the tube, brown-pubescent. *Corolla-tube* puberulous, slender.

Fruit succulent, bright blue, crowned by calyx-teeth, .25 in. across, pyrenes 5.

K. & J. HILLS.

Fr. 11.

10. *Lasianthus longicauda* Hk. f.

A small shrub; stem green, branches slender, green. *Leaves* 3-5 by .8-1 in., lanceolate, very long caudate-acuminate, entire, membranous, glabrous, pale beneath; lateral nerves 8-11 on either half, slender, looped with shorter undulate ones, midrib prominent; base acute; petiole .2-.3 in. long; stipules caducous. *Flowers* sessile, in shortly peduncled axillary paniced cymes. *Calyx* minute, puberulous. *Corolla* glabrous. *Fruit* turquoise blue, .25 in. across, pyrenes 4.

MISHMI HILLS, KHASI HILLS up to 5,600 ft.

Flrs. 6-7. Fr. 9-10.

11. *Lasianthus Biermanni* King.

A bush (8-10 ft.) with horizontal branches. *Leaves* 4-6 by 1-2 in., elliptic or lanceolate, caudate-acuminate, entire, subcoriaceous, strigose on petiole and nerves beneath; lateral nerves 5-7 on either half, tertiaries parallel, more or less transverse; petiole .2-1 in. long. *Flowers* dull blue in axillary peduncled cymes pointed downwards and forwards .6-.7 in. long. *Calyx* tube obconic, strigose outside; teeth triangular or broadly lanceolate. *Corolla* trumpet-shaped, glabrous outside. *Fruit* metallic blue, sub-globose, .5 in. across; pyrenes 6.

KHASI HILLS, up to 6,000 ft.

Flrs. 4-6. Fr. 12-2.

42. BORRERIA G. F. W. Mey.

***Borreria hispida* K. Schum.** Syn. *Spermacoce hispida* Linn.

A procumbent scabrid, hirsute or hispid herb with often perennial roots. *Branches* stout, 4-angled. *Leaves* .5-1.5

by .3-.6 in., obovate, spathulate, oblong or elliptic, obtuse or acute, scabrid above. *Flowers* whorled. *Corolla* blue or white. *Capsule* hispid or pubescent.

ASSAM (F. B. I.).

Roots possess properties similar to Sarsaparilla. *Seeds* have been recommended as a substitute for coffee.

Flrs. 7-10. Fr. 9-12.

43. RUBIA Linn.

Rubia cordifolia Linn. The Indian Madder. *Manjistha*, Sans.; *Soh-misem*, Khasi.

A climbing herb with perennial rootstock, stem scabrid, aculeate, 4-gonous. *Leaves* whorled, 1-3 by .5-1.5 in., ovate, lanceolate, acuminate, margins minutely prickly, thinly coriaceous, hispid above, scabrous on the nerves beneath; lateral nerves 5-7 on either half; base rounded or cordate; petiole up to 2.5 in. long, triangular with hooked prickles. *Flowers* usually 5-merous, yellowish in terminal umbellate paniced cymes, branches trichotomous. *Calyx-tube* small, globose; limb obsolete. *Corolla* hispid, greenish with racemed petals, divided nearly to the base. *Stamens* adnate to the corolla tube; anthers oblong, exserted. *Ovary* 2-celled; ovules solitary in each cell, attached to the septum; style 2; stigma globose, exserted. *Fruit* globose, purplish-black when ripe with a purple juice inside, .12-.17 in. across, didymous, broad, albumen horny; radicle slender, inferior.

KHASI HILLS.

Roots and stem give yellow and red dyes according to treatment with other ingredients. The plant has got medicinal properties according to Ayurvedic and Hakimee Pharmacopæa.

Flrs. 8-9. Fr. Cold season.

Rubia sikkimensis Kurz. obtainable from Mishmi Hills. (No specimens in Shillong Herbarium). Yields dye staff similar to *R. cordifolia*.

44. GALIUM Linn.

Galium rotundifolium Linn.

A perennial scandent diffuse herb; branchlets 4-gonous. *Leaves* whorled, .4-1 by .2-.4 in., sessile or sub-sessile,

ovate or elliptic, acute, mucronate or obtuse, subcoriaceous, hispid with 3 prominent basal nerves. *Flowers* minute, usually tetramerous, in terminal cymes; branches very slender. *Corolla* white or yellowish; lobes valvate. *Stamens* on the corolla tube; filaments short; anthers didymous. *Ovary* 2-celled; style short with 2 arms; stigma capitate. *Fruit* dry, small, hispid with hooked hairs. *Seeds* adhering to the pericarp, plano-convex, ventrally grooved; testa membranous; radicle inferior, elongate.

KHASI HILLS.

Flrs. 7.

Galium Mollugo Linn.—also occurs in KHASI HILLS (nerves obscure, 3-nerved from the base).

Richardsonia pilosa H. B. & K.

A puberulous herb. *Leaves* 1-1.5 by .4-.8 in., elliptic, acute, membranous; base acute or cuneate; stipules divided. *Corolla* valvate. *Ovules* 1 in each cell, ascending; micropyle facing downwards.

An American plant now wild in Shillong.

Flrs. & Fr. Rainy season.

FAM. 72. VALERIANACEÆ.

Usually herbs, annual or perennial, branching distichous. *Leaves* opposite, exstipulate (but the petioles are often united at the base by a rim,) entire, pinnatifid or pinnate. *Flowers* polygamous or diœcious, assymetric, usually pentamerous, generally sessile in cymose panicles, bracteate. *Calyx* adnate to the ovary, little developed at the time of flowering, afterwards often forming a pappus. *Corolla* lobes usually 5 (3-5), imbricate in bud, gibbous, spurred at the base. *Stamens* 1-4, epipetalous, alternating with the corolla lobes; anthers introrse. *Ovary* inferior, 3 locular, only 1 cell is fertile containing one pendulous anatropous ovule; style filiform. *Fruit* dry, indehiscent, 1-seeded, crowned with the calyx limb. *Seeds* usually exalbuminous; embryo straight; cotyledons flat; radicle superior.

The Indian Nard (*Jatamansi*, Sans.), *Nardostachys Jatamansi* DC., which is a perennial herb of economic importance inhabiting the Alpine Himalayas (11,000-15,000 ft.) belongs to this family.

VALERIANA Linn.

Perennial herb. *Leaves* entire or pinnatifid. *Flowers* in corymbosely paniced cymes; bracts small. *Calyx-limb* involute in flower, afterwards forming deciduous plumose bristly pappus. *Corolla* funnel-shaped, sometimes gibbous at base; lobes 5. *Stamens* 3. *Ovary* 3-celled, 1-ovuled; stigma 2-3 fid or subentire. *Fruit* oblong, compressed, with 3 dorsal and 1 ventral rib, crowned with the pappus.

Stem 1-5 ft., pubescent below. Root-stock hardly thickened. Leaves pinnate; leaflets 3-7 pairs. Radicle undivided, disappearing at fruiting time. Fruit hairy. 1. *V. Hardwickii*.

Stem not more than 18 ft., pubescent. Root-stock thick, horizontal. Leaves entire or pinnate. Radicle usually toothed. Fruit hairy or nearly glabrous. 2. *V. Wallichii*.

1. Valeriana Hardwickii Wall.

Pubescent below. *Stem* 1-5 ft. *Root-stock* hardly thickened, descending, fibrous. *Radical* leaves few, usually undivided, long petioled, disappearing before fruiting time, 2-3·9 by 1·5-3 in., ovate-acute. *Cauline* leaves pinnate, 3-6 in.; leaflets 3-7, lanceolate, usually entire, acuminate, the terminal one longest. *Flowers* reddish. *Inflorescence* lax in fruit. *Bracteoles* shorter than the fruit. *Fruit* hairy.

KHASI & JAINTIA HILLS (5-6,000 ft.).

The root is used sometimes for medicine but mainly as a perfume. There is little doubt that it may prove an efficient substitute for "Valerian" (Dymock).

Flrs. 8-10. Fr. 11-12.

2. Valeriana Wallichii DC. Vern. Jatung, Khasi.

Pubescent. *Stem* 6-18 in. *Root-stock* aromatic, thick, horizontal with thick descending fibres. *Radicle* leaves persistent, long petioled, 1-3 in. diameter, deeply cordate or cordate-ovate usually toothed and acute. *Cauline* leaves shorter petioled, smaller and fewer, entire or pinnate. *Inflorescence* not very lax even in fruit. *Fruit* hairy or glabrous.

KHASI & JAINTIA HILLS (5-6,000 ft.).

The roots are used in every way similar to *V. Hardwickii*.

Flrs. 4-5. Fr. 5-7.

Patrinia speciosa Haud-Mazz K. B. 1934 (no specimen in Forest herbarium).

FAM. 73. DIPSACEÆ.

Perennial herbs, rarely shrubs. *Leaves* opposite, exstipulate, sometimes connate at the base (*Dipsacus*) entire, toothed or pinnate. *Flowers* in cymose whorls or in dense heads surrounded by bracts; bracteoles often conspicuous. *Calyx-tube* adnate to the ovary, usually constricted above it; limb cup-shaped, bristly. *Corolla* funnel-shaped; limb 2-5 lobed, equal or bilabiate, imbricate. *Stamens* usually 4, epipetalous. *Ovary* 1-loc; ovule one, pendulous, anatropous; style filiform; stigma capitate or linear, terminal or lateral. *Fruit* an achene enveloped in an epicalyx. *Seed* albuminous; embryo straight; radicle superior.

***Dipsacus asper* Wall.**

A stout erect prickly perennial herb. *Leaves* 4-8 by 1.6-3.5 in., connate at the base, pinnately lobed, hairy above, nearly bristly on the nerves beneath; lobes toothed, pilose above, scabrous beneath. *Flowers* white, in cymose sub-globose heads; bracteoles obovate-lanceolate, ciliate.

KHASI HILLS, up to 6,000 ft.

Flrs. 9. Fr. 11.

***Dipsacus inermis* Wall. Unarmed Teasal.**

An erect herb. *Leaves* pinnatifid, hairy on both surfaces. *Calyx* segments subquadrangular, hairy, deciduous. *Corolla* tube funnel-shaped. *Fruit* 8-ribbed.

Closely resembles *D. asper* Wall.

ASSAM, (Kew Bulletin 1930).

Flrs. 7-8.

***Morina betonicoides* Benth.**

A perennial spiny herb. *Stem* 6-18 in. long. *Leaves* about 4 in. long, spiny. *Corolla* pale-purple. *Calyx* segments herbaceous, bilabiate. *Fertile stamens* 4, sub-equal. *Achene* free in the base of the involucrel.

(Kew Bulletin 1934).

FAM. 74. COMPOSITÆ

Herbs or shrubs, rarely trees. *Leaves* alternate, rarely opposite, simple or compound; base of leaf or petiole sometimes sheathing, exstipulate. *Flowers* sessile, in a dense head on the enlarged end of the axis of various shapes (flat, straight, convex or even spindle shaped); common receptacle enclosed in an involucre of whorled calyx-like bracts; bracteoles 0 or reduced to paleate scales or bristles, pentamerous, all tubular (discoid) or the outer or all ligulate, all bisexual or the inner bisexual or male, the outer female or neuter, sometimes monœcious or diœcious. *Calyx* superior, rarely absent, sometimes a 5-lobed rim at the top of the ovary, usually it takes the form of hairs or bristles (pappus) and enlarges after fertilization into a parachute or hooked bristles. *Corolla* actinomorphic (tubular) or zygomorphic; of the latter there are two forms, labiate and ligulate; lobes usually 5, valvate. *Disc* epigynous. *Stamens* usually 5, epipetalous; filaments short, free; anthers introrse usually cohering by their edges. *Ovary* 1-loc; style simple, forking at end into 2 stigmas; there is often a brush of hairs on the style below the stigmas; ovules solitary, erect, anatropous. *Fruit* (cypsela) dry, indehiscent. *Seeds* exalbuminous; embryo straight; cotyledons plano-convex; radicle short.

This family is very extensively represented in Assam, but many herbaceous plants have been omitted.

I. Flowers (disc) not ligulate, no latex :—

- i. Heads homogamous; flowers never yellow; anthers arrow-shaped at base, rarely sub-cordate; style arm subulate, hairy; leaves usually alternate :—

Heads distinct, usually many flowered; pappus long, copious; leaves cauline.

1. **Vernonia.**

Heads 1 or few flowered crowded into dense bracteate clusters; pappus chaffy; leaves chiefly radical.

2. **Elephantopus.**

- ii. Heads homogamous; flowers never pure yellow; anthers blunt at base; style-arms usually elongate-obtuse, minutely papillose; pappus usually setose. Leaves alternate or opposite:—
Invol. bracts many achenes 5-angled. 3. **Eupatorium.**
- iii. Heads heterogamous rayed or discoid or homogamous rayless; anther base blunt; style-arms flattened or plano-convex; leaves usually alternate :—
Flowers all yellow, ray ligulate; heads in scorpioid cymes; pappus 1-2 seriate, slender, scabrid. 4. **Solidago.**
Ray flowers slender, tubular or with very short ligule; disc flowers yellow. Heads very small, pappus long, copious. 5. **Microglossa.**
- iv. Heads heterogamous rayed or discoid or homogamous and rayless; anther base tailed; style various; flowers ray and disc) usually yellow; leaves alternate :—
Heads corymbose, panicled or fascicled :—
Pappus 1-seriate, caducous, bracts narrow; usually aromatic herb. 6. **Blumea.**
Heads in dense globose or ovoid clusters :—
Pappus 0; bracts paleaceous; herb with winged stem. 7. **Sphæranthus.**
Heads corymbose or fascicled; bracts scarious usually hyaline :—
Pappus slender, scabrous, caducous; common weed. 8. **Anaphalis.**
Heads solitary, corymbose or panicled, rayed. Bracts many seriate; outer herbaceous; outer most often foliaceous :—
Pappus short, 1-2 seriate, subequal, scabrid or bearded. 9. **Inula.**
- v. Heads heterogamous, usually rayed or homogamous rayless. Receptacle paleaceous. Flowers usually yellow. Anther base not tailed. Style-arms truncate or appendiculate, or of sterile flower entire :—
Heads monœcious axillary apeta-

- lous. Anther nearly free, inflexed.
 Achenes armed with glochidiate
 spines. Pappus 0. Leaves alter-
 nate. 10. **Xanthium.**
 Heads heterogamous or homogam-
 ous. Flowers hermaphrodite, all
 fertile. Leaves usually opposite:—
 Inner invol.-bracts embracing
 the achenes. Outer invol.-
 bracts 5-glandular. . . 11. **Siegesbeckia.**
 Inner invol.-bracts not em-
 bracing the achenes:—
 Palea of receptacle flat.
 Flowers white. . . 12. **Eclipta.**
 Palea of receptacle con-
 cave embracing the achen-
 es. Flowers yellowish. 13. **Spilanthes.**
- vi. Heads heterogamous, rayed or dis-
 coid or homogamous, rayless; leaves
 usually alternate:—
 a. Invol.-bracts 2-many seriate.
 Receptacle naked. Anthers
 usually rounded at base (not
 tailed) style-arms truncate.
 Pappus 0:—
 Heads small, disciform,
 racemose or paniced.
 Corolla of hermaphrodite
 flowers 5-fid. Large
 herbs. 14. **Artemisia.**
 b. Invol.-bracts usually 1-seriate
 and sub-equal. Receptacle
 usually naked. Anther base
 obtuse, rarely tailed. Style-
 arms of hermaphrodite flowers
 truncate or obtuse, penicillate
 or with hairy tips:—
 Heads homogamous, ebrac-
 teolate, discoid. Style-
 arms usually appendicu-
 late. Flowers purple or
 red. 15. **Emilia.**
 Heads heterogamous, ray-
 ed (rarely homogam-
 ous and rayless). Style-
 arms truncate. Flowers
 yellow. 16. **Senecio.**
- vii. Heads homogamous or rarely hetero-
 gamous. Flowers all tubular. Invol.-

- bracts many seriate. Corolla-tube deeply 5-lobed. Anther cells tailed; styles subentire or arms short, hairy or thickened towards the base. Heads many flowered, separate :—
- Filaments papillose-hairy. Pappus hairy, feathery. 17. **Crisium.**
- Filaments hairy in the middle. Pappus paleaceous or 0. .. 18. **Carthamus.**
- viii. Heads heterogamous or homogamous rayed or not. Corolla all tubular; lobes narrow, ligulate, equal or obscurely bilabiate. Invol.-bracts many seriate. Anther cells sagittate, tails ciliate. Style-arms not appendaged :—
- Pappus hairs simple. Leaves alternate. Shrub. 19. **Leucomeris.**
- Flowers all ligulate, latex. Heads homogamous, ligules truncate, 5-toothed. Anther base sagittate, rarely tailed. Style-arms slender :—
- Heads simple; achenes long beaked; scapigerous milky herb. 20. **Taraxacum.**
- Heads irregularly subcorymbose, umbellate or paniced; achenes not beaked; milky herb. 21. **Sonchus.**

1. VERNONIA Schreb.

Herbs, undershrubs, shrubs or small trees or climbers. *Leaves* alternate, often toothed. *Heads* terminal or axillary, homogamous, solitary or in paniced cymes. *Involucre* ovoid, globose or hemispheric; bracts many seriate, inner longest. *Receptacle* naked or pitted, sometimes hairy. *Flowers* usually purple, all tubular. *Corollas* all equal; lobes 5, narrow. *Anthers* obtusely auricled at base. *Style-arms* subulate, puberulous. *Fruit* striate, ribbed, angled or truncate. *Pappus* usually in 2 rows; the outer simple, shorter, bristly or paleaceous; the inner longer and plumose.

Erect :—

Invol.-bracts all or outermost subulate or lanceolate, often aristate :—

Heads large 1 in. across or more, few :—

Heads 30-40 flowered. Pappus reddish. A stout undershrub. .. 1. *V. subsessilis.*

Heads small, .25 in. across or less :—

Heads about 20 flowered. Pappus white or dirty white. Herbaceous perennial, hoary-pubescent. .. 2. *V. cinerea*.

Heads about 8-12 flowered; achenes ribbed. Shrubby, hairy. 3. *V. divergens*.

Invol.-bracts all obtuse or apiculate, usually linear or oblong :—

Outer invol.-bracts larger than the inner with leafy tip :—

A robust leafy annual. 4. *V. anthelmintica*.

Outer invol.-bracts much shorter than the inner :—

Trees or shrubs :—

Heads usually large :—

Achenes obscurely 10 ribbed, glabrous. Head 1-6 flowered, pappus white or yellowish. .. 5. *V. arborea*.

Achenes 10 ribbed, glabrous. Heads 3-10 flowered. Pappus whitish. 6. *V. volkameriæfolia*.

Achenes 10 ribbed, glabrous. Heads 8-20 flowered. Pappus reddish. 7. *V. talaumiifolia*.

Achenes costate hairy. Heads 20 flowered. Pappus white. .. 8. *V. Parryae*.

Climbing :—

Heads 5-10 flowered. Pappus red. .. 9. *V. scandens*.

1. *Vernonia subsessilis* DC.

A stout undershrub growing among rock under shade. *Leaves* 2-7.5 by .3-1.5 in., narrowly lanceolate or oblanceolate, acute or acuminate, obscurely or distantly toothed or sinuate, chartaceous, glabrescent above, pubescent beneath; lateral nerves 7-10 on either half, slender, inconspicuous above, more or less pubescent beneath; base narrowed into the petiole, often emarginate; petiole 0.2 in. long. *Inflorescence* in corymbose heads; peduncles pubescent; bracts foliaceous, linear-oblong. *Heads* about 40-flowered; invol.-bracts subulate, pubescent, often recurved. *Flowers* purple, fading white, *Corolla* glabrous. *Fruit* ribbed. *Pappus* reddish, unequal, persistent.

KHASI HILLS, ascending up to 2,000 ft.

Flrs. 10-11. Fr. 12.

2. Vernonia cinerea Less.—Almost a perennial herb and one of the most common weed occurs throughout the area.

This plant is also used in Hindu medicine (febrile affections, piles, conjunctivitis, etc.).

Flrs. 7-8. Fr. 11-12.

3. Vernonia divergens Benth.

A shrub or undershrub, rusty pubescent throughout. *Leaves* very variable, 5-6 by .5-3 in., elliptic, rhomboid or lanceolate, usually serrate; lateral nerves 5-10 on either half, arched; base cuneate; petiole short. *Flowers* pale blue in terminal corymbosely paniced cymes. *Pollen* grain hexagonally reticulate. *Pappus* brown or whitish.

ASSAM, MANIPUR (Brandis).

Flrs. & Frs. Cold season.

4. Vernonia anthelmintica Willd. Vern. *Kalazira*, Beng.; *Somaraji*, Sanskrit.

A robust coarse pubescent annual. *Leaves* 3-8 in., elliptic, lanceolate or ovate-lanceolate, coarsely serrate. *Heads* purple, .6-.7 in., several together in each peduncle, often subcorymbose. *Invol.-bracts* linear-oblong, apiculate, scarious below. *Fruit* .15 in. long, truncate, black, hairy. *Pappus* reddish or dirty, outer row paleaceous.

Common weed near villages.

In Hindu medicine the seeds are of great repute as a medicine for various diseases. The juice of the leaves is also given to cure phlegmatic discharges from the nose.

Flrs. 9-12. Fr. Cold season.

5. Vernonia arborea Ham. Vern. *Mas-koita*, Ass.; *Pachet*, Naga; *Semkhari-phang*, Kach.

A deciduous tree (95'/59'') with spreading crown, often buttressed; branchlets pubescent. *Bark* grey, corky, having vertical fissure; blaze creamy, turning yellowish black (wood whitish or cream coloured no heart wood). *Leaves* 1.5-9.5 by .5-4 in., elliptic, elliptic-oblong or elliptic-ovate, entire or sinuate, acute or acuminate, coriaceous, glabrous,

somewhat harsh above, glabrescent or pubescent beneath; lateral nerves 12-15 on either half, quite prominent beneath; petiole .3-1.3 in. long. *Flowers* whitish or pale blue, in large terminal ferruginously pubescent paniced heads. *Head* 1-6 flowered; invol. small; bracts oblong, concave, obtuse. *Fruit* obscurely ribbed; pappus white, 1-seriate, equal.

SYLHET, CACHAR, KHASI HILLS, N. C. HILLS, LAKHIMPUR & SIBSAGAR.

Bark is chewed by Nagas as a substitute for *Pan*.

Flrs. 2-3. Fr. 11.

6. *Vernonia volkameriæfolia* DC. Vern. *Dieng-duma*, *Dieng-soh-iksarlaupa*, Khasi; *Dieng-la-iar*, *Dieng-duma-blai*, Synt.

A large shrub or middle sized tree; young shoots and leaves rusty pubescent. *Bark* greyish brown, rather closely reticulately split, deep green underneath corky layer; inside greenish white, soon turning dirty green. *Leaves* 3.5-12 by .8-4.4 in., oblanceolate or oblong-obovate, entire, repand or coarsely dentate, acute, subcoriaceous, puberulous; midrib stout; lateral nerves 8-10 on either half; base cuneate; petiole stout with a decurrent base for half the circumference of the branchlet. *Flowers* in large terminal cymosely paniced heads; invol.-bracts more or less hairy, oblong, with obtuse or rounded ends. *Petals* strap-shaped, ribbed, recurved, purplish. *Fruit* ribbed and almost glabrous. *Pappus* whitish, or dirty white, filiform, persistent (.35 in.); few outside unequal.

MISHMI HILLS (Griffith), KHASI & JAINTIA HILLS, ascending up to 5,000 ft.

Flrs. 12-1. Fr. 3-4.

7. *Vernonia talaumifolia* Hook. f. Vern. *To-thueng*, Synt.

A small or middle sized tree (25'/21"), trunk generally notched. *Bark* brown; blaze blackish; wood white. *Leaves* 10-20 by 1-3 in., obovate or oblanceolate, bluntly acute or mucronate, entire or sinuate, coriaceous, glabrous above, slightly hairy on the midrib beneath; base narrowed into

a short petiole, .5 in. long. *Inflorescence* large, much branched; invol.-bracts almost glabrous, ovate. *Pappus* red.

KHASI HILLS, NAGA HILLS, up to 2,500 ft.

Flrs. 10-12. Fr. 1-3.

V. talaumifolia *Hk. f.* Var. *hirsutior* *C.E.C. Fischer* (Kew Bull. 1935).

8. *Vernonia Parryae* *Fischer*.

An undershrub. *Branches* thin, sulcate, fulvous pubescent towards the upper end. *Leaves* 4-8 by .5-1 .2 in., elliptic, somewhat linear, often falcate, acuminate, remotely, minutely, dentately smooth; lateral nerves 7 on either half; reticulation more prominent beneath; base narrowed into the petiole; petiole .12-.4 in. long. *Inflorescence* cymose, axillary; bracts linear, .4-1 in. long, resembling floral-leaf, fulvous pubescent towards the base; pedicels fulvous pubescent. *Head* .5 in. diameter of 20 florets; invol.-bracts numerous, pilose outside, glabrous inside; margin scarious. *Receptacles* glabrous. *Corolla* purple, .3-.4 in. long. *Achene* thin, costate with white hairs, .1 in. long; *Pappus* white, erect, barbellate, .3 in. long.

LUSHAI HILLS (Bharbuk-Mrs. N. E. Perry—January/32, 507).

9. *Vernonia scandens* *DC.*

A rambling woody climber; young parts slightly pubescent. *Bark* yellowish thin; blaze green, turning blackish yellow. *Leaves* .8-7 by .5-3.5 in., elliptic to ovate-lanceolate, entire, sharply acuminate, membranous, more or less puberulous on both surfaces, paler beneath; lateral nerves about 5 on either half, arcuate; base narrowed into the petiole; petiole slender, up to .3 in. long. *Flowers* in long terminal leafy paniced 5-10 flowered heads; invol.-bracts in several rows, ciliate, ovate or linear-lanceolate, acute or obtuse, scarious. *Fruit* glabrous, ribbed; pappus reddish up to .3 in. long.

LAKHIMPUR, SIBSAGAR, GARO HILLS, (SYLHET—Hook. f. T), KHASI & JAINTIA HILLS ascending up to 5,000 ft.

Flrs. 12-1. Frs. 3.

Vernonia Mastersii Watt.—A shrub. *Bark* greyish, .16 in. thick, granular, slightly vertically split; blaze greenish white with black streaks, turning blackish. *Leaves* 5-8 by 2-3 in., ovate-oblong, acute or acuminate, coriaceous, glabrous above, tomentose beneath; lateral nerves 10-12 on either half, impressed above, prominent beneath; base rounded; petiole 1-1.5 in. long. *Inflorescence* pubescent. *Head* 16-20 flowered; invol.-bracts ovate, concave, pubescent outside. *Achenes* glabrous, subcylindric, .1 in. long, glabrous, obscurely 4 angled; pappus reddish.

NAGA HILLS, KHASI HILLS, SIBSAGAR.

Flrs. Cold season. Fr. Hot season.

Vernonia bracteata Wall.

A rigid shrubby plant, scaberulous; branches terete. *Leaves* 1.5-4 by .5-1.2 in., elliptic or elliptic-lanceolate, acute, distantly denticulate-serrate. *Capitulum* many flowered; bracts linear-oblong; achenes glabrous. *Pappus* pinkish.

KHASI and JAINTIA HILLS, up to 6,000 ft.

Flrs. 8. Fr. 4. (following year).

Vernonia blanda DC.

A rambling shrub. *Leaves* elliptic, acuminate, entire, glabrous; base cuneate. *Panicles* puberulous; heads 10-25 flowered. *Achenes* 10-ribbed, pubescent; pappus red.

NAGA HILLS.

2. ELEPHANTOPUS Linn.

Elephantopus scaber Linn. Vern. *Kombat-skur-sniang*, Khasi.

A stiff scabrous herb, dichotomously branched. *Radical leaves* oblanceolate, obovate-lanceolate, cuneate; amplexicaul leaves attenuate, sessile, 1-3 by .5-1 in. *Heads* homogamous, 2-5 flowered in dense cluster, each cluster being supported by usually 3 cordate rigid ovate foliaceous bracts (about 8), which are dry, flat or conduplicate. *Corolla* purplish; limb 4-5 toothed. *Style-arms* subulate. *Fruit* truncate, .15 in. long, brown, ribbed, hairy; pappus of 5 bristles, dilated at base.

KHASI & JAINTIA HILLS.

The embryo not unfrequently germinates in the head. (Hooker-F. B. I.).

A decoction of the root and leaves is given in cases of dysuria. A preparation from the root is given in fever. Boiled bruised leaves

with rice is given for swelling or pains in the stomach (Indian Medicinal Plants).

Flrs. 10. Fr. Cold season.

3. EUPATORIUM Linn.

Eupatorium cannabinum Linn. Vern. *Samsing*, *Dursummok*, Garo; *Tongol-lati*, Ass.; *Sam-khabli*, Kach.; *Long-renchick*, Kuki; *Kombat-nong-rim*, Khasi; *Kal-bun*, Mik.

A coarse perennial, often straggling. *Leaves* .8-4.5 by .3-2.5 in., usually opposite, sometimes alternate, lanceolate, ovate-lanceolate, coarsely serrate, acuminate, scabrid above, pubescent beneath; lateral nerves almost obscure; base narrowed into the petiole; petiole up to .7 in. long. *Flower* heads corymbose, homogamous. *Invol.-bracts* oblong, many seriate, unequal, ribbed or channelled; outer ones shorter; receptacle naked. *Corolla* regular, tubular, 5-lobed. *Stamens* syngenesious; anther appendaged. *Style-arms* long, obtuse. *Fruit* truncate, black with 5 ridges. *Pappus* white, filiform, 1-seriate, numerous, rigid, about twice the length of the fruit.

DARRANG, KAMRUP, GARO HILLS, N. C. HILLS & K. & J. HILLS.

Recommended as a deobstruent in visceral obstruction consequent to intermittent fevers and externally as a discutient in hydrophic swellings of the legs and scrotum (Fleming).

Flrs. 11-12. Fr. Cold season.

A pernicious invasive pest which has practically spread all over the province. Interferes with natural regeneration of timber trees and is a great menace to plantation.

Other species of the genus which occur in the area are *E. burmanicum* DC.; *E. odoratum* Linn. & *E. Wallichii* DC.*

4. SOLIDAGO Linn.

Solidago Virga-aurea Linn. Golden rod.

An erect perennial glabrous or pubescent herb; stem stout, sub-simple, 6-24 in. high. *Leaves* .8-5 by .2-1.3 in., attenuate, lanceolate, acute or acuminate, lower ones

* *E. odoratum* is a very widely scattered pest found everywhere in Assam—R. N. De.

petiolate, distantly serrate, upper ones smaller, almost entire, sub-sessile. *Heads* 1-4 on short axillary peduncles, collected in a long leafy panicle. *Ray-flower* 1-seriate, about 8; female flowers ligulate; disk-flowers tubular. *Invol.-bracts* unequal, coriaceous, many seriate, narrow-acute. *Receptacle* naked. *Anther* bases obtuse. *Style-arms* of hermaphrodite flowers flattened. *Fruit* glabrous or puberulous.

KHASI HILLS, ascending up to 5,000 ft.

Known as wound wort in English. Used very successfully in cases of dropsy; also efficacious in case of œdema when the dried powdered plant is administered with beaten eggs. (I. M. Plant).

Flrs. 11. Fr. Cold season.

***Solidago nemoralis* Ait.**

Shrubby. *Leaves* 1-3·5 in., alternate, narrow, lanceolate, acuminate, remotely seriate; upper ones smaller, almost entire. *Scorptoid* cymes 2-3·5 in. long.

Shillong (Cultivated) 5,000 ft.

***Erigeron asteroides* Roxb. Vern. *Bonoria-kopat*, Bon. Ass.**

A coarse villous erect annual up to 2 ft. high, much branched. *Cauline* leaves numerous, amplexicaul, oblong or obovate, toothed or lobulate. *Radical* leaves obovate, coarsely toothed, petiolulate. *Heads* about ·25 in. across, usually in few flowered, terminal corymbs; involucre bracts 1-3, serrate. *Ligules* blue; disc florets tubular, yellow. *Cypsela* comprises ·03 in., almost glabrous; pappus dirty, white or brownish.

SIBSAGAR, 200 ft.

Flrs. & Fr. 4-10.

5. MICROGLOSSA DC.

***Microglossa volubilis* DC. *M. pyrifolia* (Lam) O. Ktze.**

A rambling shrub 10 ft. high; branches ribbed. *Leaves* 1-3 by ·3-1·5 in., ovate-elliptic, entire or distantly serrate, acuminate, very thinly chartaceous, glabrous above, finely pubescent beneath; lateral nerves 5-7 on either half, slender, arched and branched; secondary reticulate; base acute; petiole ·3-·5 in. long; *Heads* yellow, heterogamous, peduncled, clustered on the branches of corymbs. *Ray-flower*-female 1-many seriate, fertile; disk-flower-male often sterile. *Involucre* campanulate; bracts many seriate, lanceolate, unequal, outer

short, margin scarious. *Receptacle* flat, wider or slightly fimbriate. *Corolla* of ligulate flowers with bifid whitish ligule; anther-base obtuse, entire. *Disk* flowers tubular campanulate, 5 lobed; anther-base obtuse. *Fruit* minute, tetragonous, more or less compressed. *Pappus* soft, fine, silky, reddish.

MANIPUR, NAGA HILLS, SIBSAGAR, KHASI & JAINTIA HILLS.

Flrs. & Fr. Cold season.

Microglossa albescens C. B. C.

A stout shrub; branchlets obscurely grooved. *Leaves* 3·4·5 by ·75-1 in., narrow, lanceolate, acuminate, entire or distantly seriate, glabrous, whitish beneath; lateral nerves fine; base narrowed with a short petiole, ·1·2 in. long. *Flower* heads ·3 in. across arranged in peduncle laxly clustered spreading corymb. *Achene* obscurely 5-angled; pappus reddish.

NAGA HILLS, (No. 15,628, up to 10,000 ft.)

Flrs. 9. Fr. later.

6. BLUMEA DC.

Annual or perennial herbs, undershrubs or occasionally shrubs, glandular pubescent, woolly or glabrous, usually aromatic. *Leaves* alternate, usually toothed or lobed. *Heads* not rayed, heterogamous, corymbose, panicled or fascicled, rarely racemose. *Involucre* ovoid or campanulate; bracts many seriate, imbricate, soft or herbaceous, the outer smaller. *Receptacle* flat, naked or pubescent. *Flowers* yellowish, rarely purple or white, the outer flowers female, many seriate, the inner male, few, fertile. *Corolla* of female flowers filiform, minutely 2·3 toothed; of male flowers tubular, slender, 5-lobed. *Anther-base* sagittate with small tails. *Style* finally exserted, filiform or linear, subulate, minutely papillose. *Fruit* small, terete, angled or ribbed. *Pappus* scanty, 1-seriate, often caducous.

Heads many, villous, ·3 in. across :—

Pappus white. Erect herbs. Leaves toothed or serrate. Achenes subtetragonous. ..

1. *B. lacera*.

Heads very numerous, large or small :—

Pappus white :—

Scrambling or scandent shrub. Corolla lobes hairy. Achenes 10 ribbed, hairy.

2. *B. chinensis*.

Leaves papery, oblanceolate-acuminate, glabrous; corolla lobes glabrous or glandular. Shrub; branches stout, glabrous or puberulous; petiole often appendaged.

3. *B. myriocephala*.

Leaves elliptic-lanceolate, usually pinatifid or woolly, deeply toothed, white, felted beneath. Corolla lobes hairy. A herb. Petiole marginate or winged.

4. *B. densiflora*.

Leaves coriaceous, elliptic or oblanceolate, silky woolly. Small tree; branches stout, silkily woolly or villous. Petiole auricled.

5. *B. balsamifera*.

Leaves membranous, villous or pubescent beneath. A straggling aromatic plant, rather shrubby. Petiole winged.

6. *B. aromatica*.

1. *Blumea lacera* DC.

A coarse or slender very variable herb, villous or glandular, rarely glabrescent with a strong camphor or turpentine smell. *Leaves* 1-6 by .5-2 in., obovate or elliptic-obovate, sharply, coarsely or doubly toothed, rarely lyrate or lobulate, obtuse, densely white, silky beneath; lateral nerves obscure; base narrowed into the petiole; petiole up to .2 in. long. *Heads* small, up to .3 in. across, arranged in axillary cymes or terminal panicles, sometimes corymbose. *Invol.-bracts* linear-acuminate, more or less hairy, margin scarious. *Receptacle* glabrous. *Corolla* yellow. *Fruit* grey-brown, sub-tetragonous, minutely pubescent or glabrescent. *Pappus* white.

SIBSAGAR, KHASI HILLS, up to 1,000 ft.

Mixed with black pepper it is given in cholera (Watt). Expressed juice of the leaves is a useful anthelmintic (specially in cases of thread-worm-Watt). "Highly thought of, by many Hospital Assistants as a febrifuge and astringent." It is a remedy in Turea Tarsi (I. M. Plants).

Flrs. Cold season. Frs. 4.

2. *Blumea chinensis* DC.

A scrambling or scandent shrub; stem sulcate. *Leaves* 1-5 by .4-1.5 in., ovate-oblong or lanceolate, acuminate,

distantly cuspidate-serrate, sub-coriaceous, glabrous; lateral nerves 5-6 on either half, arched, slender; base cuneate; petiole (and young stem) pubescent, .1-.2 in. long. *Flowers* white. *Heads* clustered on the distant branches of a pubescent panicle. *Involucre-bracts* unequal, puberulous; outer short. *Receptacle* densely white, hairy; arms of style cylindrical. *Fruit* 10 ribbed. *Pappus* simple, scabrous.

SYLHET, MANIPUR, KHASI & JAINTIA HILLS, ascending up to 4,500 ft.

Flrs. 2-3 Fr. 4-5.

3. *Blumea myriocephala* DC.

A shrub; branches stout, thick, puberulous, ultimately glabrous. *Leaves* 3-10.5 by .8-2.5 in., oblanceolate, acuminate, distantly serrulate, glabrous, coriaceous; lateral nerves numerous; base narrowed into a winged petiole; petiole .2-1 in. long. *Head* up to .3 in. across, clustered on an elongate tomentose erect panicle. *Invol.-bracts* tomentose. *Receptacle* more or less villous. *Corolla* lobes glabrous. *Fruit* ribbed, hairy. *Pappus* red.

LAKHIMPUR, SIBSAGAR, SYLHET (De Silva).

Flrs. 10-11. Fr. 2.

4. *Blumea densiflora* DC.

Herbs; stems stout. *Leaves* large, 6-14 by 1-2 in., elliptic-lanceolate, usually pinnatifid or irregularly and deeply toothed acute or obtuse, scaberulous above, white felted beneath; lateral nerves inconspicuous, midrib stout; base narrowed into a marginate or winged short petiole. *Inflorescence* tomentose or white felted, panicked, branched. *Invol.-bracts* narrow, rather rigid. *Receptacle* glabrescent. *Corolla* lobes of female flowers hairy. *Fruit* ribbed. *Pappus* red.

MISHMI HILLS, NAGA HILLS, SIBSAGAR, KHASI HILLS.

Camphor prepared from this plant was pronounced identical with that imported from China (Watt).

Flrs. & Fr. 12-2.

5. *Blumea balsamifera* DC.

A large short-lived aromatic shrub or small tree, gregarious on abandoned *jhums* (shifting cultivation); branches, leaves and inflorescence densely silky tomentose. *Leaves* 2-8·5 by ·5-2 in., elliptic or oblong-lanceolate, serrate, sometimes lobulate, acuminate, silky villous, membranous; base narrowed into the petiole; petiole up to ·1 in. long. *Flowers* heads small, up to ·3 in. across, sessile or shortly peduncled in clusters on the branches of a large spreading panicle. *Invol.-bracts* silky tomentose. *Receptacle* glabrous. *Fruit* ribbed. *Pappus* reddish.

GARO HILLS & KHASI HILLS, up to 4,000 ft.

Ai or Ngai camphor of S. W. China is distilled from this plant. A warm infusion acts as a pleasant sudorific and it is a useful expectorant as a decoction.

Flrs. 11-12. Fr. 3-4.

6. *Blumea aromatica* DC.

An aromatic undershrub attaining up to 10 ft. in height with glandular hairs. *Leaves* 2-16 by ·5-5 in. (those subtending the branches of inflorescence gradually narrower and smaller), oblanceolate or lanceolate, irregularly serrulate or rarely lobulate, membranous and flabby scabrous; lateral nerves 10-20 on either half; tertiaries irregularly reticulate; base narrowed into the petiole; petiole (lower leaves) often marginate, short, (upper) sessile. *Inflorescence* a large spreading panicle up to 16 in. in length. *Invol.-bracts* slender, puberulous. *Receptacle* glabrous. *Flowers* white, minutely pilose at the tips. *Corolla* lobes glandular. *Fruit* 10 ribbed, densely pilose. *Pappus* red.

NAGA HILLS, DUFFLA HILLS, KHASI & JAINTIA HILLS, up to 3,000 ft. (No specimen in the Forest herbarium)

Flrs. and Fr. Cold season.

Other herbaceous species of this genus recorded from the region of the flora are :—*B. glomerata* DC., *B. hieracifolia* DC. *B. Hookeri* Clarke, *B. oxyodonta* DC.*

* *B. laciniata* DC., *B. procera*, DC., *B. squarrosa* DC. also occur in Assam—R. N. DF

7. SPHÆRANTHUS Linn.

Sphæranthus indicus Linn. *Mundi, Munditika*, Sans.

Weed, very common on fallow lands about a foot high, stem cylindrical, glandular hairy; wings of stem toothed. *Leaves* alternate, decurrent on the stem, $\cdot 2\cdot 1\cdot 2$ by $\cdot 1\cdot 5$ in., linear-oblong or obovate-oblong, toothed or serrate, glandular, acute or obtuse, villous. *Heads* small, heterogamous not rayed, collected together in a close terminal globose or ovoid compound involucre capitate cluster $\cdot 5\cdot 6$ in. across; peduncle winged, pubescent. *In each head* outer flowers are female, few or many, fertile, the central flowers bisexual, fertile or sterile. *Involucre* narrow; bracts paleaceous, spathulate, acute, ciliate. *Receptacle* small, naked. *Corolla* of female flowers slender, tubular, minutely 2-3 toothed; of hermaphrodite flowers tubular or funnel-shaped, 4-5 toothed. *Anther-base* sagittate, auricles acute or tailed. *Style-arms* filiform, sometimes connate. *Fruit* angular, sub-glabrous. *Pappus* absent.

KAMRUP, SYLHET, GOALPARA.

The seeds and the roots are considered to have anthelmintic properties. Powdered root is considered stomachic and the ground bark mixed with whey is a valuable for piles. It is also considered a powerful tonic deobstruent and alterative. In Punjab the flowers are highly esteemed as alterative, depurative, cooling and tonic, (I. M. Plants.)

Flrs. 2. Fr. 4.

8. ANAPHALIS DC.

Anaphalis cinnamomea Clarke.

A tall stout leafy perennial, rather shrubby; stem grey woolly or cinnamon coloured, leafy. *Leaves* alternate, sessile, $1\cdot 5\cdot 4$ by $\cdot 4\cdot 7$ in., lanceolate, occasionally falcate, acuminate, entire, membranous, glabrescent, dark green above, usually cinnamon coloured and woolly beneath, usually 3-nerved, rarely more or less; base amplexicaul or auriculate. *Heads* $\cdot 3$ in. across, numerous in terminal bracteate compound corymbs. *Invol.-bracts* many seriate, scarious, outermost short, woolly; inner petaloid. *Receptacle* naked. *Flowers* whitish. *Outer* flowers many, slender, fertile; corolla 2-4 lobed. *Inner* flowers usually sterile; corolla 5-lobed. *Fruit*

minute, oblong, glabrous. *Pappus* of female flowers slender, scabrid, caducous; of hermaphrodite flowers often thickened at the apex.

KHASI HILLS, ascending up to 5,000 ft.

Flrs. 9. Fr. 10-12.

Anaphalis triplinervis C. B. C.

A perennial woody herb. *Leaves* amplexicaul, 2-4 by .75-1.2 in., elliptic-oblong, acute, whitish, woody beneath, usually 3-nerved. *Heads* corymbs; bracts whitish. *Achene* very small, oblong.

NAGA HILLS, (No. 15,634-10,000 ft.)

Flrs. 9. Fr. 11-12.

Gnaphalium purpureum Linn.

A rather stout woody or cottony herb. *Leaves* 1-2.5 (or more) by .3-.5 in., spatulate or narrowly obovate, rounded or apiculate, woolly. *Heads* .25 in across, usually in axillary globose cluster from the upper leaves (less often spicate); bracts acute or acuminate; inner linear-oblong, rounded. *Corolla* (bisexual); tip puberulous. *Cypsela* smooth or minutely papillose; pappus hairs markedly united at the base.

SIBSAGAR.

Flrs. & Fr. 3-8.

G. luteo-album Linn. Var. *multiceps* and *G. hypoleucum* DC are also recorded from the province.

9. INULA Linn.

Herbs or shrubs. *Leaves* alternate. *Heads* heterogamous, radiate or not, at the ends of branches, panicled, corymbose or solitary. *Outer flowers* female, 1-many seriate, fertile-yellow or white; central flowers hermaphrodite, yellow. *Invol.* usually hemispheric or campanulate; bracts many seriate, outer herbaceous, outermost often foliaceous. *Receptacle* flat, pitted, areolate or tumid. *Corolla* of fem. flrs. ligulate, 3-toothed; of herm. flrs. tubular, tube elongate, slightly wider upwards, 5 lobed. *Anther-base* sagittate with simple or branched tail. *Style-arm* of herm. flrs. linear-flattened, broader upwards, obtuse. *Fruit* usually ribbed, subterete. *Pappus* rather short, 1-2 seriate, smooth, scabrid or bearded.

Leaves cuspidate-serrate, woolly tomentose beneath; lateral nerves not very conspicuous.

Receptacle pitted. 1. *I. Cappa*.

Leaves irregular toothed, pubescent beneath; lateral nerves quite prominent. Receptacle areolate. 2. *I. eupatorioides*.

1. *Inula Cappa* DC. Vern. *Batabap-arong*, Mik.; *Dieng-ialih*, Synt.

A stout undershrub, often shrubby up to 8 ft. high; branches brownish silky or woolly. *Leaves* 2-6 by .5-2 in., oblong-lanceolate, distantly cuspidate-serrate, usually acute, coriaceous; upper surface pubescent with adpressed bulb-based hairs, undersurface silky tomentose or woolly; lateral nerves usually 8-12 on either half, rather inconspicuous; petiole up to .4 in. long. *Heads* about .2 in. across, in much branched terminal and axillary often corymbose panicles. *Invol.-bracts*, linear, ending in a sharp point. *Receptacle* pitted. *Fruit* .05 in. long, pubescent. *Pappus* hairs dirty-white, feathery.

N. C. HILLS, KHASI & JAINTIA HILLS, ascending up to 5,000 ft.

Flrs. 8-11. Fr. 12-2.

2. *Inula eupatorioides* DC. Vern. *Kamli*, Nep.

A woolly shrub up to 6 ft. in length; branches pubescent. *Leaves* 1.5-9 by .5-3 in., elliptic-oblong, lanceolate, irregularly toothed, acuminate, scaberulous above, pubescent beneath; lateral nerves 10-15 on either half, prominent, subparallel, arched; petiole stout, up to .3 in. long. *Invol.-bracts* adpressed pubescent, lanceolate, subulate. *Receptacle* areolate. *Fruit* adpressed-silky, pubescent. *Pappus* feathery.

KHASI HILLS, ascending up to 6,000 ft.

Flrs. 11. Fr. 2-3.

10. XANTHIUM Linn.

***Xanthium Strumarium* Linn.** Vern. *Lokra*, Garo; *Ghagra*, Sylh.; *Ogoro*, Ass.; *Parohanthor*, Mik.

A coarse annual; stem hispidilose or strigillose. *Leaves* 1.5-4.5 in. long and as broad, broadly triangular-ovate or

suborbicular, often lobed, acute, scabrid or hispid; petiole .7-3 in. long. *Flowers* unisexual in single or clustered axillary heads. *Fem. involucre*s burr-like, covered with hooked spines; male heads at the top of the inflorescence. *Anthers* exserted; base entire. *Cypsela* enclosed in the hardened cells of the utricle. *Pappus* 0.

Common throughout the province.

Young shoots are eaten cooked. Fruits are slightly narcotic. Useful in many diseases, a good diuretic, powerful diaphoretic and sedative.

Flrs. Cold season. Fr. 4.

11. SIEGESBECKIA Linn.

Siegesbeckia orientalis Linn. Vern. *Soh-barthud-lib*, Khasi.

A large erect annual rather coarse herb, almost shrubby up to 4 ft. in length, branched, glandular pubescent. *Leaves* 1.5-4.5 by .5-2.5 in., upper gradually smaller, opposite, ovate, triangular, coarsely crenate, deeply and irregularly toothed, acute or acuminate, softly pubescent; base cuneate, decurrent on the short petiole (up to .2 in. long). *Heads* small, yellow, peduncled in leafy panicles. *Invol.-bracts* dissimilar, 2-seriate; outer 5 linear-spathulate, glandular; inner 5 boat-shaped, glandular, embracing the flowers. *Receptacle* concave with many chaffy pales enclosing the bisexual flowers. *Cypsela* glabrous, obovoid, oblong, slightly rough, black, not compressed.

N. E. F. TRACT, KHASI HILLS, ascending up to 6,000 ft.

Antiseptic properties have been ascribed to this forest plant when applied externally to sores. Valuable depurative and has healing properties in gangreneous ulcers and sores.

A mixture of equal parts of the herb and glycerine has been tried with good effect in ring worm and similar parasitic eruption. (I. M. P.).

Flrs. 8-9 & Fr. 10-12.

12. ECLIPTA Linn.

Eclipta alba Hassk. Vern. *Kanharaj*, *Kesaraja*, Ass.; *Kesaraja*, Sans.

A diffuse or erect much branched strigosely hirsute annual. *Leaves* .5-2.2 by .2-.6 in., usually oblong, lanceo-

late or elliptic, subentire or distantly toothed, acute or acuminate; base cuneate; petiole slender, short, up to .2 in. long. *Heads* subglobose, small, heterogamous, short peduncled, solitary or in pairs, axillary or terminal. *Invol-bracts* biseriate, leafy, ovate-obtuse or acute, strigose; the outer 5 leafy; the inner narrower, about 3. *Receptacle* flattened, pales slender, plumose. *Anther-base* obtuse, sub-acute. *Style-arms* short with obtuse appendages. *Fruit* verrucose, minute, areolate. *Pappus* obsolete or of 1-2 minute teeth.

SIBSAGAR, GOALPARA.

In Hindu medicine it is principally used as a tonic and deobstruent in hepatic and splenic enlargements. It is anodyne and absorbent and relieves headache when applied with a little oil. The juice of the leaves is given in one tea-spoonful dose in jaundice and fevers. Its application promotes growth of hair on the shaved scalp. (I. M. Plants).

Flrs. 8-9. Fr. 10-12.

Blainvillea rhomboidea Cass.

A rigid scabrous herb. *Leaves* 2-4 in. long, opposite or upper alternate, ovate, seriate, 3-nerved; base cuneate. *Heads* heterogamous, small; *Ligules* whitish or yellowish. *Achenes* cuneate, truncate, marked with faint horizontal lines. (Kew Bulletin, 1934)

13. SPILANTHES Linn.

Spilanthes Acmella Linn. Vern. *Huin*, *Dieng-shir-mit-bar-ngain* (=toy-chillies), Synt.

A trailing herb. *Leaves* .5-2.2 by .3-1.2 in., opposite, triangular, ovate or lanceolate, distantly serrate, acute, 3 nerved. *Heads* yellow, solitary or in long terminal panicles; several series of outer flowers with small rays, inner all tubular. *Involucre* ovoid or campanulate; bracts sub-2-seriate, slightly unequal. *Receptacle* elongate; pales enclosing the flowers. *Anther-base* truncate. *Style-arms* rather long, truncate. *Fruit* of disc flowers usually compressed. *Pappus* absent or of 2-3 bristles.

KHASI & JAINTIA HILLS, ascending up to 5,000 ft.

Used by Syntengs for sore mouth, also efficacious for tooth ache.

A bit of lint dipped in the tincture and laid on the gum repeated 3 or 4 times a day has a speedy effect in reducing the pain and swelling. (Pharmacographia Indica Vol. II., p. 283).

Flrs. & Fr. Cold season.

Centipeda orbicularis Lour. Vern. *Hachuti* or *Hansia* Bon; Ass.; *Mechitta*, Beng.

A diffuse often prostrate, annual weed of wet places, spreading. *Leaves* alternate, obovate or obovate-oblong, remotely dentate. *Flowers* in solitary, axillary, globose, almost sessile heads; bracts biseriate, spreading in fruit; receptacle naked; calyx-limb 0. *Petals* of female florets connate, obscurely toothed; stamens syngenesious; style short, truncate in bisexual florets. *Cypselæ* 4-angled, tip obtuse, angles airy; pappus 0.

SIBSAGAR, 200 ft.

Flrs. 4. Fr. 5-6.

14. ARTEMISIA Linn.

Artemisia vulgaris Linn. Vern. *Khel-bijak*, (cotton leaved), Garo; *Sangien*, *Dieng-tlio*, Synt.

A tall aromatic shrub, often forky, up to 8 ft. high; stem leafy. *Leaves* sessile, 1-3 by .5-1.5 in., alternate, aromatic, ovate, lobed, lacinate or deeply pinnatisect with stipule-like lobes at the base, pubescent above, white felted beneath; upper leaves smaller, 3 lobed or entire, lanceolate. *Heads* ovoid or subglobose, solitary or fascicled, heterogamous or homogamous. *Invol.-bracts* few seriate, villous, with scarious margins, ovate or oblong, softly woolly, the inner larger, sometime membranous. *Anther-base* obtuse, entire. *Fruit* minute, oblong, ellipsoid. *Pappus* 0.

GARO HILLS, KHASI HILLS, ascending up to 6,000 ft.

Used in asthma and diseases of the brain. It is a valuable stomachic, deobstruent and antispasmodic. Used as a tonic, anthelmintic and expectorant (I. M. Plants).

Flrs. 10. Fr. 3.

A. parviflora Roxb.—A shrubby inodorous perennial (Disc flowers sterile; lower leaves usually simple, cuneate) is also recorded from KHASI HILLS, ascending up to 5,000 ft.

Cremanthodium reniforme Benth.

A perennial scapigerous herb, almost glabrous. *Leaves* 4 by 2 in., reniform, sinuate-toothed, membranous, glabrous, palmately nerved;

petiole slender, up to 11 in. long. *Scape* about 18 in. long; head about 2 in. across; involucre bracts oblong-lanceolate, acuminate, slightly hairy. *Ligule* yellow, oblong-lanceolate. *Achene* cuneate, .2 in. long; pappus whitish.

NAGA HILLS, (No. 15,650 up to 10,000 ft.)

Flrs. 9. Fr. Cold season.

C. Thomsoni *C. B. Clarke.*

A perennial scapigerous herb, almost glabrous. *Leaves* subradical, 1-1.5 in. across, reniform, crenate. *Heads* solitary; involucre bracts acuminate, 5 in., oblong-lanceolate. *Ligules* yellow, 3-fid. *Achenes* .12-.16 in., linear-oblong; pappus reddish-brown.

(Kew Bulletin, 1934.) Delei Valley (13,000 ft.).

Flrs. 7-8.

C. rhodocephalum *Diels.* is also found in the Delei Valley 11-12,000 ft.

15. EMILIA Cass.

***Emilia sonchifolia* DC.**

A slender nearly glabrous herb up to about 20 ft. high. *Upper cauline* leaves lanceolate or oblong-lanceolate, auricled; lower leaves 3-4 in. long, lyrate pinnatifid. *Heads* small, few flowered, .35-.5 in. long. *Involucre* connate tubular, splitting into 8-10 segments in fruit. *Receptacle* naked. *Corolla* lobes short, rosy. *Style-arms* short, subterete, acute. *Cypsela* 5-angled, scabrid. *Pappus* soft, white, copious.

KHASI HILLS, ascending up to 4,000 ft.

In Madras, decoction of the plant is said to be a febrifuge (Rheede). Juice of the leaves is cooling and is prescribed for eye inflammation and also for night blindness (dry).

Flrs. 4. Fr. Rainy season.

16. SENECIO Linn.

Herbs, shrubs or small trees, sometimes scandent. *Leaves* radical or alternate, entire or variously partite. *Heads* usually yellow. *Involucre* cylindric; bracts usually 1-seriate, equal, erect, free or connate at base with an outer row of short bracteoles. *Receptacle* various. *Ray-flrs.* fairly ligulate; disk-flrs. hermaphrodite, tubular, 5-fld. *Corolla* slender. *Anther-base* obtuse, auricled or minutely tailed. *Style-arms* of hermaphrodite flowers recurved, the tips

truncate or penicillate or shortly pointed. *Fruits* subterete or those of outer flowers compressed, 5-10 ribbed. *Pappus* copious or sparse, usually soft, white, smooth, scabrid or barbellate.

Heads few flowered. (12 or less):—

All flowers tubular:—

Leaves ovate-cordate. A woody climber. 1. *S. araneosus*.

Leaves elliptic or elliptic-lanceolate.

An undershrub. 2. *S. lushaiensis*.

Ligulate flowers 2-5:—

Leaves elliptic or oblong-lanceolate.

A woody climber. 3. *S. triligulatus*.

Heads many-flowered:—

Climber. Leaves lanceolate or hastate;
base auricled. 4. *S. scandens*.

Erect shrubs:—

Anther cells tailed:—

Achenes glabrous. Heads in
axillary or terminal corymbose
panicles. 5. *S. densiflorus*.

Achenes laxly villous. Heads
larger than (5), ebracteolate. .. 6. *S. Nagensium*.

Achenes sub-quadrangular, pilose
at the angles. Heads corymbose.
Corymbs many peduncled; brac-
teoles many. 7. *S. Rhabdos*.

1. Senecio araneosus DC. Vern. *Jermei-ja-long-ap*,
Khasi.

A large woody climber, (stem sends out roots when in contact with earth.) *Leaves* 3-6·5 by ·5-2·5 in., ovate-cordate, acuminate, entire, serrate or occasionally lobulate, acuminate, glabrous above with loose web of fine cotton underneath, 5-7 nerved at base; petiole up to 3 in. long. *Heads* oblong, about 12 flowered in clusters on the branches of terminal and axillary bracteate corymbs. *Invol.-bracts* 8, linear-obovate, almost glabrous, apex ciliate. *Receptacle* rugose, not hairy. *Corolla* brownish yellow, tipped green. *Pappus* of very fine hairs shorter than the corolla.

KHASI HILLS, ascending up to 5,000 ft.

Flrs. 11.

2. Senecio Lushaiensis Fischer.

An undershrub. *Branches* thin, striate with multicellular short hairs, which are dense towards the lower end

Leaves 2·5-4 by ·8-1·2 in., elliptic, elliptic-lanceolate, acute or acuminate, serrate, covered with short reddish crisp hairs along the nerves; lateral nerves 5-6 on either half, conspicuous below; reticulation distinct on the dorsal surface; petiole covered with crisp hairs, ·75-1·25 in. long. *Inflorescence* corymbose, axillary with capitulate peduncles more or less covered with short reddish multicellular crisp hairs. *Bracts* (lower) leaf-like, upper minute, linear. *Capitula* ·3 in. across, 7-10—flowered. *Invol.-bracts* free, 8 (sometimes 2 or 3 minute, linear, lanceolate, extra bracts also occur), sub-acute or obtuse, ·17·2 in. long. *Receptacle* fimbriate. *Flowers* deeply golden yellow. *Corolla* (ligulate) ·3 in. long, narrow-oblong; lobe more or less obtuse, many nerved. *Style* minute, truncate, penicillate. *Corolla* (tubular) funnel-shaped, ·25 in. long. *Anthers* short, adnate. *Style* thick. *Achenes* cylindrical, gradually amplified, ·1 in. long, 5 ribbed, glabrous. *Pappus* white, beaked, ·2 in. long.

LUSHAI HILLS, 7,000 ft.

(Mrs. N. E. Parry 574) January.

3. *Senecio triligulatus* Ham.

A glabrous woody climber. *Leaves* 4-5 in. long, elliptic or ovate—lanceolate, caudate-acuminate, more or less serrate, membranous; petiole ·3 in. long. *Inflorescence* puberulous. *Heads* ·25 in. long, few flowered, ebracteolate in axillary and terminal corymbose panicle. *Flowers* 2-3 (ligulate), tubular in each involucre. *Invol.-bracts* 5-8, linear-oblong, ·5 in. long; ligules very short, 2-nerved, lobes of tubular flower revolute. *Achenes* glabrous. *Pappus* dirty-white.

MISHMI HILLS, MANIPUR, NAGA HILLS (Brandis).

(No specimen in the Forest Herbarium).

4. *Senecio scandens* Don.

A pretty climber (shrubby). *Branches* ribbed zig-zag. *Leaves* 2-4 by ·7-1·5 in., ovate-lanceolate or hastate, crenate or distantly denticulate, acuminate, membranous, slightly

villous; base acute or obtusely double bracket-shaped; petiole .3-.8 in. long, auricled. *Heads* .3 in. diameter on the divaricate branches of lax terminal corymbs. *Invol.-bracts* 10-15, linear-oblong, acute; ligules about 8. *Fruit* slender, 4-angled or ribbed. *Pappus* white, filiform, about twice the length of the fruit.

KHASI HILLS, ascending up to 6,000 ft.

Flrs. 9-10. Fr. 12-1.

5. *Senecio densiflorus* Wall.

An undershrub 4-6 ft., more or less gregarious; stem, inflorescence and undersurface of leaves white felted. *Leaves* 4-8 by 1.7-3.5 in., ovate, elliptic or lanceolate, doubly serrate with a thickened margin, acuminate; harsh with scattered stiff hairs above, white felted beneath; lateral nerves 10-15 on either half; petiole up to 1 in. long. *Heads* campanulate in terminal and axillary corymbose panicles. *Invol.-bracts* linear, acute. *Receptacle* pitted and bristly. *Flowers* yellow, outer rayed, inner tubular. *Anthers* yellow with a white tail. *Fruit* glabrous, obscurely 5 fluted; pappus very white, about 30.

KHASI and JAINTIA HILLS, ascending up to 6,000 ft., NAGA HILLS.

The leaves are applied to boils (Stewart).

Flrs. 11-12. Fr. 3-4.

6. *Senecio Nagensium* C. B. Clarke.

A shrub similar to *S. densiflorus*. *Leaves* 4-6 by 1.5-3 in., upper leaves thin, lanceolate or ovate-elliptic, serrate, coriaceous, acuminate, clothed with cinnamon colour cottony wool, upper side finely araneose; lateral nerves 12-16 on either half; base rounded or obtuse not auricled. *Heads* slightly larger than that of *S. densiflorus*, ebracteolate, outer whorl of the involucre without black tail. *Achenes* laxly villous.

MANIPUR, (4,000 ft., No. 41984), NAGA HILLS (Journ. of Linn. Soc., Vol. XXXV., p. 39, 1890).

7. *Senecio Rhabdos* C. B. Clarke.

A much branched shrub; young parts pubescent. *Leaves* 3-5 by 1-1.5 in., elliptic-acute or acuminate, serrate, reddish pubescent, biauricular towards the underside of petiole; lateral nerves glandular; base acute; petiole short, .1-.2 in. long. *Heads* corymbose, axils densely flowered towards the upper ends. *Inflorescence* pubescent; corymb many peduncled; bracteoles many, subulate. *Capitula* numerous. *Invol.-bracts* 5-6, oblong, margins scarious, dorsal side compressed, subglabrous. *Flowers* (tubular), 5-lobed, (ligulate) 3-lobed. *Invol.-bracts* many, overlapping, pale-yellow. *Anthers* towards the base without tail.

Kohima (4,500 ft., 41829), MANIPUR (5,500 ft., 41296).

Flrs. & Fr. Cold season.

S. Simonsii Clarke.—A glabrous handsome plant; branches flexuous. *Leaves* 4-5 in. long, broadly elliptic. *Heads* small, 8-10 flowered, ebracteolate. *Pappus* white. *Achenes* 5-angled, glabrous.

Besides above, the following annual and perennial species of *Senecio* are recorded from the region of the flora—*S. chrysanthemoides* DC, *S. obtusatus* Wall, *S. Griffithii* H. f. & T., *S. ramosus* Wall, *S. linifolius* C. B. Clarke, *S. Meshmi* C. B. Clarke and *S. macranthus* C. B. Clarke.

17. *CIRSIUM* H. f. & T.

Cirsium Lepskyle Petral=*Cnicus Griffithii* Hook. f. Vern. *Soh-chiia*, Khasi; *Sumori-kaura*, Nep.

A thistle-like herb. *Leaves* sessile or base auricled, 2.5-6 by .7-2.5 in., pinnatifid; lobes lanceolate, acute, spinescent, setulose above, white tomentose beneath. *Heads* bisexual. *Invol.-bracts* many seriate; outer short with acicular apex, the rest linear-wavy, aristate or acuminate. *Corolla* 1.25 in. long, 5-lobed. *Anther-base* sagittate, auricled, tails slender. *Style-arms* short, obtuse. *Cypsel* obovoid-oblong, obtusely 4-angled. *Pappus* copious, feathery, unequal, up to 1 in. long, the longer hairs usually clavellate.

KHASI HILLS, ascending up to 6,000 ft., MISHMI HILLS, UPPER ASSAM.

Seeds aromatic, eaten by the Khasis also young shoots by Nepalis.

Flrs. & Fr. Cold season.

Cirsium chinense *Gard et Champ* and *C. involucratum* *DC.*, also occur in KHASI HILLS.

18. CARTHAMUS Linn. Safflower.

Carthamus tinctorius *Linn.* Vern. *Colap-machu*, Manip.; *Kusumba*, San.

A thistle-like branching herb. *Leaves* sessile, .5-2 by .2-.6 in., lanceolate, usually spinosely serrate. *Heads* large, terminal. *Flowers* orange red. *Invol.-bracts* many seriate; outer foliaceous, green, usually spinous; inner-lanceolate, ovate-oblong, acute. *Cypselæ* obovoid, 4-angled, truncate with 4 bosses. *Pappus* absent.

MANIPUR, ASSAM (G. Mann's, No. 1885). Cultivated.

The dye is derived from the flowers and the oil from the seeds. The plant has got various medicinal properties (laxative, diaphoretic, remedy for itch, cold and jaundice). The oil is used as a liniment in rheumatism (Stewart).

Flrs. & Fr. Spring season.

19. LEUCOMERIS Don.

Leucomeris decora *Kurz.*

A small deciduous tree; young shoots tomentose. *Leaves* 5-7 in. long, elliptic or elliptic-lanceolate, acuminate, membranous, glabrous on both surfaces when mature; petiole 1-2 in. long. *Flower* heads fragrant, densely crowded at the ends of leafless branchlets. *Invol.-bracts* woolly at the base, outer imbricating along the peduncle. *Flowers* white, fragrant, nearly 1 in. long. *Pappus* pale-brownish, .5 in. long. *Achenes* about .5 in. long, densely villous.

MANIPUR (Brandis).

Flrs. 3 (Kurz).

20. TARAXACUM Hall.

Taraxacum officinale *Wigg.*

A scapigerous perennial with milky juice. *Leaves* radical, sessile, narrowly oblong, irregularly pinnatifid; lobes linear or triangular. *Heads* solitary on a hollow leafless scape. *Flowers* yellow, all ligulate. *Invol.* campanulate;

bracts many seriate; inner 1-seriate, linear, erect, tips thickened or clawed; outer ovate, short, erect or recurved. *Receptacle* flat, naked. *Style-arms* long. *Cypselæ* glabrous, ribbed, beaked. *Pappus* silky.

KHASI HILLS, 5,000 ft. (Kanjilal's, No. 7161).

Allied to English Dandelion.

Decoction of the roots and leaves is efficacious in chronic disorder of the bowels.

Flrs. 5. Fr. Rainy season.

21. SONCHUS Linn.

***Sonchus arvensis* Linn.** Modern name *Prenanthes Yakoensis* Jeffr, Kew. Bull. 1934. Vern. *Ki-lan-jiat*, Khasi; *Ban-palang*, Beng.

An annual milky herb with creeping rootstock. *Leaves* radical.

KHASI HILLS, 5,000 ft.

Leaves are eaten cooked in curry. Santals use the root for jaundice. The plant is also eaten by horses and cattle.

Flrs. & Fr. 10-2.

***Lactuca macrorhiza* Hk. f.**

A glabrous or sparsely villous milky herb. *Leaves* variable, irregularly divided, membranous. *Flowers* clear pale blue. *Ligules* bluish or purplish. *Achenes* blackish, more or less 5 ribbed, flat, narrowed into a white-beak; pappus silky white, deciduous.

LUSHAI HILLS, 6,500 ft. (Wenger 378).

Flrs. 12. (Kew Bulletin, 1932).

***L. sativa* Linn** is the garden lettuce. Cultivated throughout India.

***Enhydra fluctuans* Lour.** Syn. *E. Heloncha* DC. *Hingtsha repens* Roxb. Vern. *Hingcha*, *Heloncha*, Beng., *Hilamchika*, Sans.

A glabrous marsh-herb; stem prostrate, rooting at the nodes. *Leaves* opposite, sessile, 1-2 in., serrate, gland-punctate beneath. *Heads* terminal or axillary, sub-sessile, 3-7 in. across, unilateral or in alternate axils, heterogamous, subradiate; ray flowers female many seriate, fertile, ligule minute, broad, 3-4 toothed; corolla of ray-flowers 3-lobed to one side, disk flowers female fertile or the inner sterile. *Cypselæ* oblong, enclosed in the rigid pales; outer dorsally; inner sometimes laterally compressed; pappus 0.

Common throughout the plains districts of both valleys of ASSAM on rich damp soil. (often aquatic.—R. N. De).

The leaves are generally sold in the markets and are eaten as vegetable. Being somewhat bitter they are considered to be wholesome and invigorating and are also regarded as laxative, antibilious and useful in diseases of the skin.

Flrs. & Fr. 12-1.

Gynura nepalensis DC., *G. angulosa* DC., *G. Pseudo-chine* DC., and *G. crepidioides* Benth occur in Assam.

STYLIDIACEÆ.

Herbs, rarely undershrubs. *Leaves* alternate or clustered, entire, exstipulate. *Flowers* 1-2 sexual, irregular in panicles, corymbs or racimiform cymes. *Calyx* superior, 2-lipped. *Corolla* rarely regular. *Stamens* 2; filaments connate with the style into a column; anther cells ultimately sub-confluent. *Ovary* inferior, 2-celled; stigma at the apex of the column; ovules numerous in each cell on the middle of the septum. *Capsule* 1-2 celled, 2-valved, valves sometimes cohering at both top and bottom. *Seeds* many, minute, albuminous; embryo minute, next the hilum.

Stylidium Kunthii Wall.

A delicate herb. *Leaves* clustered, obovate-spathulate, orbicular. *Inflorescence* glandular hairy. *Flowers* white or purple .12-.15 in. across. *Calyx* upper lip 3-lobed, lower notched. *Stamens* 2; filaments connate with the style into a column. *Capsule* .3-.5 in., linear, valves dehiscing from the top.

KHASI HILLS, SYLHET (Wallich).

Flrs. & Fr. 10-1.

FAM. 75. CAMPANULACEÆ.

Herbs, undershrubs or shrubs, erect or climbing, usually with latex. *Leaves* simple, usually alternate (rarely opposite), exstipulate. *Flowers* hermaphrodite (rarely unisexual), regular or zygomorphic, generally 5-merous, axillary or terminal, solitary, racemose or paniculate. *Bracts* small; bracteoles usually absent. *Calyx-tube* adnate to the ovary, usually persistent, and 5 partite (exceptionally more or less). *Corolla* tubular or campanulate, sometimes bilabiate, valvate. *Stamens* 4-6, alternating with the corolla lobes, inserted usually on the edge of the epigynous honey secreting disc (rarely epipetalous); anthers introrse, sometimes united. *Ovary* 2-5 celled; styles simple; stigma lobes as many as carpels, placentation axile; ovules numerous, anatropous. *Fruit* capsular or baccate, sometimes indehiscent and dry. *Seeds* numerous, small, ellipsoid; albumen fleshy; testa usually thin; embryo straight, radicle next the hilum.

Flowers actinomorphic :—

Fruit a capsule with a conical elongated			
beak. Ovary 3-celled. .. ..	..	..	1. Codonopsis.
Fruit indehiscent, truncate. Ovary 4-6	..	..
celled. .. ..	..	..	2. Campanumœa.

Other genera of the family, all herbaceous, viz., Pratia, Lohelia Cephalastigma are also well represented in the region of the Flora.

1. CODONOPSIS Wall.

Codonopsis Griffithii Clarke.

A perennial twiner. *Leaves* 5-2·5 by ·4-1 in., opposite and alternate, ovate, elliptic-oblong, entire, acute, membranous, densely silky pilose beneath, less so above; lateral nerves about 6 on either half; base subcordate, truncate-rhomboidal or rounded; petiole slender up to ·7 in. long, sparsely hairy. *Flowers* solitary, axillary or leaf opposed, large, greenish blue with purple veins; peduncles up to

1·3 in. long, pubescent. *Calyx* superior; segments 5, foliaceous. *Corolla* campanulate. *Testa* very much conspicuously reticulated.

KHASI HILLS, up to 5,000 ft.

Flrs. 8. Fr. Cold season.

2. CAMPANUMŒA Blume.

Perennial herbs; root tuberous; stem twining or rambling. *Leaves* usually opposite. *Flowers* solitary, lateral or terminal. *Calyx* inferior or superior, 4-6 partite. *Corolla* superior, campanulate; lobes 4-6. *Fruit* indehiscent.

Stem twining. *Leaves* obcordate; petiole long up to 1·5 in. long. *Inflorescence* axillary or leaf opposed. *Ovary* truncate. *Seeds* reticulated.

1. *C. javanica*.

Stem erect. *Leaves* lanceolate; petiole short.

Inflorescence terminal. *Seeds* not reticulated. 2. *C. parviflora*.

1. Campanumœa javanica Blume.

Dextrorse Climber. *Leaves* ·5-2 by ·3-1·7 in., obcordate; crenate-serrate, membranous, glabrous; petiole ·3-1·5 in. *Flowers* solitary, axillary or leaf opposed; peduncles ·15-1 in., about ·3 in. across, apetalous. *Calyx* lobes broad, herbaceous. *Anthers* conniving, almost sessile; no style; female flowers large, about 2 in. across. *Corolla* greenish-white marked with irregular purple veins; filaments ·5-·6 in. long; anther slender. *Ovary* truncate; style with 5 spreading petal-like stigmatic lobes. *Seeds* prominently reticulated.

KHASI HILLS, ascending up to 5,000 ft.

Flrs. 9. Fr. 11.

2. Campanumœa parviflora Benth. Vern. Ja-tyndong, Khasi.

Erect perennial; branches spreading. *Leaves* 1·5-4·5 by ·3-1·5 in., lanceolate, serrate-acuminate, glaucous beneath; petiole ·1-·2 in. *Inflorescence* terminal. *Flowers* usually 4-merous. *Calyx* with narrow segments, free. *Corolla* small

with a short tube. *Ovary* 4-celled. *Seeds* numerous not reticulated.

KHASI HILLS, up to 600 ft.

Leaves are eaten cooked.

Flrs. 9. Fr. 11.

FAM. 76. VACCINIACEÆ.

Shrubs or small trees often epiphytic; stems often very much thickened at the base. *Leaves* alternate or falsely whorled, entire or serrate, extipulate. *Flowers* bi-sexual, regular in racemes or solitary, axillary; bracts 1; bracteole often 2, frequently thickened and articulate below the ovary. *Calyx-tube* ovoid, adnate to the ovary; limb 5-fid, persistent. *Corolla* tubular, ovoid or campanulate, 5-lobed, deciduous. *Stamens* 10, epigynous, free; anthers opening by apical pores or upwards into 2 tubes opening by slits. *Ovary* inferior, 5-celled or falsely 10-celled; style cylindric; stigma simple. *Fruit* a berry, rarely dry and indehiscent. *Seeds* numerous in each cell (rarely) small, compressed, albuminous; embryo minute.

1. Corolla long, tubular or shortly campanulate with long segments :—

Calyx limb 5-fid, tube terete.	..	1. Agapetes.
Calyx limb 5-fid, tube 5-angled or winged, enlarged in fruit.	..	2. Pentapterygium.
2. Corolla small, campanulate or ovoid with short teeth :—

Flowers in axillary racemes; sometimes epiphytic.	..	3. Vaccinium.
Flowers in corymbs; epiphytic.	..	4. Corallobotrys.

1. AGAPETES D. Don.

Evergreen shrubs usually epiphytic; stems often thickened at the base. *Leaves* alternate, sometimes falsely whorled, usually coriaceous, often with glands at the apex of the

petiole. *Flowers* usually in axillary corymbs or fascicled, rarely solitary; pedicel often thickened or articulate below the ovary; bracts small. *Calyx-tube* globose; limb 5-partite, persistent, adnate to the ovary. *Corolla* tubular or campanulate, red, often with transverse marks, or the lobes greenish-white, 3-lobed. *Stamens* 10; filaments usually short; anthers elliptic, produced upwards in 2 long beaks opening by apical pores or slits, often spurred behind; style cylindric; stigma capitate. *Berry* globose, succulent or almost dry, often opening by 10 pores round the disc within the calyx teeth. *Seeds* numerous, ellipsoid, outer coat usually very lax.

Corolla long, tubular, lobes short :—

 Anthers not spurred :—

 Corolla curved at the apex :—

 Corolla deep red, transverse veins
 V-shaped.

1. *A. setigera*.

 Corolla straight at the apex :—

 Calyx supported by an epicalyx :—

 Corolla bright red, transverse
 bars obscure :—

 Fruit bright red, ovoid.

2. *A. auriculata*.

 Corolla green and white,
 densely pubescent, V-shaped,
 transverse, leaves rose colour-
 ed :—

 Fruit globose.

3. *A. glabra*.

 Calyx not supported by an epi-
 calyx :—

 Corolla .6 in. long :—

 Leaves almost sessile,
 linear-lanceolate. . .

4. *A. salicifolia*.

 Corolla 1.25 to 1.5 in. long :—

 No transverse veins in the
 corolla :—

 Leaves sub-sessile,
 elliptic-lanceolate. . .

5. *A. miniata*.

 V-shaped transverse veins
 on the corolla :—

 Leaves petioled, broad-
 ly lanceolate. . .

6. *A. macrophylla*.

 Corolla 1.5-2 in. long :—

 Darker transverse veins on
 the pale purple corolla :—

 Leaves shortly petioled,
 broadly lanceolate. . .

7. *A. macrantha*.

- Corolla .75-1 in. long.
 Peduncles 1 or 2 flowered :—
 Leaves lanceolate or ob-
 lanceolate, crenate :—
 Corolla .75 in. long. 8. *A. buxifolia*.
- Leaves elliptic, serrate :—
 Corolla 1 in. long. .. 9. *A. mitrarioides*.
- Corolla divided about half way down :—
 Anthers not spurred :—
 Corolla straight, .75-1 in. long,
 crimson with a white tip :—
 Leaves lanceolate-caudate-
 acuminate. 10. *A. Lobbii*.
- Corolla tubular; lobes short :—
 Corolla straight :—
 Anthers spurred :—
 Flowers in corymbs :—
 Corolla .75-1 in.
 long :—
 Calyx-teeth .12-
 .16 in. long,
 acute :—
 Leaves petio-
 late, lanceo-
 late, narrow-
 ed at both
 ends. .. 11. *A. variegata*.
- Corolla about 1 in. long :—
 Calyx-teeth .08 in. long, obtuse :—
 Leaves lanceolate, acuminate. 12. *A. angulata*.
- Corolla 2-2.5 in. long :—
 Leaves nearly sessile, oblong-
 lanceolate. 13. *A. grandiflora*.
- Corolla .25 in. long. Peduncles 1 or
 2 flowered :—
 Leaves .5 in. long. .. 14. *A. obovata*.
- Corolla 1.5 in. long :—
 Leaves .8-1 in. long. .. 15. *A. Kanjilali*.
- Corolla divided to $\frac{1}{2}$ its length or
 more :—
 Corolla straight :—
 Anthers spurred :—
 Leaves short petioled,
 elliptic, cordate-acumin-
 ate. 16. *A. pilifera*.

1. *Agapetes setigera* D. Don. Vern. *Ja-lamut*, Khasi; *La-tang-sang*, Synt.

An epiphytic shrub 6-12 ft. in height with a tuberous base. *Leaves* 3-6 by .5-2 in., falsely whorled or scattered, elliptic, obovate-lanceolate, entire or very distantly toothed, acuminate, tufted at the internodes, coriaceous, glabrous, crimson-coloured underneath; lateral nerves not prominent, forming an obscure marginal nerve; petiole 0·05 in. *Corymbs* axillary, peduncled, 6-18 flowered. *Flowers* scarlet or red, 1·2 in. long; pedicels about 1·3 in. long, hairy; bracts 0. *Calyx* green, obconic; teeth 5, lanceolate, altogether .3 in. long, with spreading pinkish bristle. *Corolla* up to 1 in. long, crimson, tubular, hirsute with V-shaped marks, sometimes obscure on the tube; lobes 5, greenish, ovate. *Anthers* long-tailed not spurred, slightly exerted. *Fruit* .3 in. across, sub-globose, (enlarged calyx-teeth half the length of the fruit.)

N.-E. F. TRACT. (Burkills No. 36302, 36250, 36382, 36639).

K. & J. HILLS, up to 4,000 ft.

Flrs. 9-3. Fr. 2-5.

Var. *verticillata*:—Leaves smaller, always entire. *Calyx* reddish. *Corolla* deep red without any V-shaped marking.

KHASI HILLS, up to 4,000 ft.

2. *Agapetes auriculata* Hook. f.

An epiphytic shrub. *Leaves* 3-7 by 1·2-2·2 in., elliptic-oblong, sessile, often falsely whorled, oblong-lanceolate, almost entire-acuminate, coriaceous, glabrous; lateral nerves rather obscure, uniting into a very slender marginal nerve; base rounded. *Flowers* in stout peduncled glabrescent, corymbs proceeding from the whorls of leaves or the old wood; pedicels enlarged, cup-shaped at the apex forming an epicalyx; bracts small. *Calyx* glabrous; teeth .25 in. long, lanceolate, striate. *Corolla* .75 in. long, crimson, tubular, urn-shaped (transverse V-shaped marks obscure); filaments ciliate at the top; anthers granular (not spurred). *Fruit* .25 in., ovoid, bright red.

KHASI HILLS, ascending up to 4,000 ft.

Flrs. 10. Fr. Cold season.

3. *Agapetes glabra* Clarke.

A shrub often epiphytic. *Leaves* 3-6 by 1-2·8 in., sessile, more or less whorled, lanceolate, sometimes elliptic or ovate, entire or obscurely crenate, acuminate, rigidly coriaceous, glabrous, shining above; lateral nerves 3-10 on either half, anastomosing or obscure towards the extremity; base rounded; corymbs densely pubescent; peduncles 1·5-4 in. long, axillary, 5-25 fld; pedicels ·5-·9 in. long, dilated upwards forming an epi-calyx at the apex. *Calyx* teeth acute. *Corolla* densely pubescent; tube narrowed upwards, usually with rose coloured V-shaped transverse veins; lobes minute, ·1-·5 in. long. *Anthers* granular (not spurred). *Fruit* ·25 in. across, globose, nearly dry.

KHASI & JAINTIA HILLS, ascending up to 4,000 ft.

Flrs. 3.

4. *Agapetes salicifolia* Clarke.

An epiphytic, glabrous; branches obscurely angular. *Leaves* falsely whorled, 3-4 by ·5-·6 in., almost sessile, linear-lanceolate, entire, coriaceous, alternate at both ends. *Flowers* in glabrous corymbs; bracts short. *Calyx* vermilion (Griffith); teeth acute. *Corolla* vermilion (Griffith) ·6 in. long; lobes short, triangular. *Anthers* not spurred.

Mishmi Hills (Griffith). (No specimen in Forest Herbarium).

5. *Agapetes miniata* Hk. f. Vern. *Son-pongpum-helh*, Khasi.

A shrub; branches stout, smooth, whitish, lenticellate. *Leaves* 3-6 by 1-2·5 in., alternate, elliptic-lanceolate, remotely serrate, acuminate or acute, coriaceous, glabrous; lateral nerves 10-12 on either half, impressed above, prominent beneath; base rounded or cuneate, almost sessile; petiole 0-·05 in. long. *Flowers* in glabrous corymbs with numerous short bracts; bracts lanceolate, ·16 in. long. *Corolla* 1·25 in. long; lobes ·16 in. long.

KHASI HILLS, PATKOI RANGE. (No specimen in Forest herbarium).

6. *Agapetes macrophylla* Clarke.

Leaves 9-11 by 3-5 in., broadly lanceolate, acuminate, remotely obscurely crenate-dentate, coriaceous; base cuneate or rounded; petiole .5 in. long, thick. *Flowers* in corymbs, peduncles up to 2 in. long; pedicels 1-1.5 in.; bracts .25 in., linear-lanceolate. *Calyx* teeth narrow-lanceolate, .3 in. *Corolla* 1.25 in. long, red, tubular, transverse; bars V-shaped; lobes .12-.16 in. long, triangular.

K. & J. HILLS (Griffith) (Kew No. 3476).

7. *Agapetes macrantha* Hk. f. Vern. *Jalmut*, Beng.

An epiphytic shrub. *Leaves* 5-7 by 1.5-2 in., elliptic or ovate-lanceolate, repand serrate, acute or shortly acuminate, coriaceous, glabrous, nerves arching along a prominent marginal nerve; base acute or obtuse; petiole short. *Flowers* fascicled, light red, variegated, 1-1.2 in. long; pedicels slender, .5-.9 in. long, thickened upwards. *Calyx* teeth glabrous, sharply acute, spreading. *Corolla* tube .8-1 in. long, (Sibpur sheet). *Anthers* spurred on the beak.

KHASI HILLS.

Flrs. 3-5. Fr. Rainy season.

8. *Agapetes buxifolia* Nutt.

An epiphytic shrub; branches pilose. *Leaves* rather hispid, 1-1.6 by .4-.6 in., lanceolate, oblanceolate or elliptic, crenate, obtuse, glabrous; lateral nerves obscure, 4-6 on either half; base cuneate, narrowed into a short petiole .1-.2 in. long. *Peduncles* usually 1-fid. or 2, axillary. *Calyx* obconic, companulate, green, pilose; segments 5, triangular-ovate. *Corolla* tubular, cylindric, bright red; lobes spreading, ovate-lanceolate. *Anthers* linear, crenulate, produced into a pair of connate slender tubes, which reach a little beyond the mouth of the corolla. *Disc* epigynous, entire, angular; style straight, erect, gradually dilated at the truncate obscurely 5-lobed apex.

DAFFLA HILLS (2-3,000 ft.). (Curtis's Botanical Magazine Tab. 5012).

9. Agapetes mitrarioides Hk. f.

A small epiphytic. *Branches* slender. *Leaves* .5-.9 by .4-.6 in., elliptic or elliptic-ovate, serrate, coriaceous, shining; base rounded; petiole .1-.2 in. long; peduncles 2-flowered. *Corolla* up to 1 in. long.

MANIPUR (Wall's No. 5984, 7-9,000 ft.) MISHMI HILLS.
(No specimen in Assam Herbarium).

10. Agapetes Lobbii Clarke.

Branches terete, leafy, glabrous. *Leaves* 3-4 by 1 in., lanceolate, caudate-acuminate, entire, coriaceous; base narrowed into a short petiole, .16-.25 in. long. *Flowers* in lax, glabrous, peduncled corymbs; peduncles .2-.5 in. long; pedicels .25-.75 in. long, epicalyx cupular, entire. *Bracts* .06 in. long. *Calyx-teeth* .16 in., lanceolate, subulate. *Corolla* narrow, tubular, crimson with a white tip, .75-1 in. long. *Anthers* not spurred.

K. & J. HILLS, NAGA HILLS (Brandis).

11. Agapetes variegata D. Don. Vern. *Lehra-ber*, Nep.; *Dieng-soh-limut*, *Jalamut*, Khasi; *Thang-chhang*, *Dieng-tang-sang*, Synt.

An epiphytic shrub; stem yellowish, smooth; blaze yellowish, turning brown. *Leaves* .3-9.5 by .5-2 in., lanceolate, subentire, acuminate, coriaceous; lateral nerves slender, numerous; base narrowed into a thick short petiole 0.2 in. long. *Flowers* bright red in dense fascicles below the leaves; pedicels slender, glabrous, thickened upwards. *Calyx* brick-red; teeth lanceolate, sharp-pointed. *Corolla* rosy red, tubular with many V-shaped transverse bands of purple-red. *Anthers* spurred. *Fruit* .3 in. in across, succulent, red to purple; testa shining, minute, foveolate.

LAKHIMPUR, K. & J. HILLS—ascending up to 5,500 ft.

Flrs. 12-4. Fr. Rainy season.

12. *Agapetes angulata* Hk. f.

Branches sharply ridged or angular. *Leaves* 3-4 by 1-1.5 in., lanceolate, acute, obscurely dentate, glabrous; lateral nerves 6-10 on either half, impressed above; base narrowed into a short petiole, similar to *Agapetes variegata*, but calyx-teeth shortly triangular and more obtuse.

N.-E. F. TRACT (Abor expedition. Burkill's No. 36349).

Fl. 1.

13. *Agapetes grandiflora* Hk. f.

A shrub. *Leaves* 3-7.5 by 1-2.5 in., sub-sessile, narrow, elliptic-lanceolate, entire or undulate, obscurely glandular-toothed, glabrous; lateral nerves rather obscure, marginal nerves more or less prominent; base rounded, almost sessile. *Flowers* fascicled on the old wood below the leaves; bracts small; pedicels about 1 in. long, thickened upward in fruit, stout. *Calyx-tube* very short, urn-shaped; teeth lanceolate, .3-.6 in. long (not supported by an epicalyx). *Corolla* red, marked with transverse bars, tubular, widened upwards; lobes short, lanceolate, .4 in. long. *Anthers* spurred on the beak, hairy below.

LAKHIMPUR, NAGA HILLS, N.-E. F. TRACTS up to 5,000 ft. (Burkill's No. 37193, 37461). GOALPARA (R. N. DE).

Flrs. 12-2. Fr. Hot season.

14. *Agapetes obovata* Hk. f. Vern. *Soh-pelleng*, *Dieng-soh-la-pydong*, Khasi.

A bushy shrub generally epiphytic or on rocks; young shoots brown-pubescent; young leaves pinkish. *Leaves* .2-.5 by .1-.2 in., obovate, obtuse, entire, coriaceous; petiole .06-.1 in. long. *Flowers* solitary, globose, .25 in. across, hyaline; buds spindle-shaped, 5-angled, dark-brown; pedicels filiform. *Calyx* minutely verrucose; teeth acute. *Corolla* verrucose outside; tube translucent; lobes recurved. *Stamens* 10; filaments long, triangular or broadly subulate, ciliate, pubescent behind; anther beak spurred; style firm, glabrous, filiform, slightly exceeding the anther

tips. *Fruit* truncate, 10-celled, 4-seeded in each cell. *Seeds* obovoid, bright, glossy, rugose, about .06 by .4 in.

K. & J. HILLS—ascending up to 5,000 ft.

Flrs. 9-11. Fr. 4-5.

15. *Agapetes Kanjilali* A. Das. Vern.. *Horugumani*, Lakhimpur.

An epiphytic shrub; young shoots pilose, hairs with reddish persistent bulbous bases, bud scales lanceolate, about .12 in. long. *Leaves* .8-1.2 by .2-4 in., elliptic, oblong or oblanceolate, entire, obtuse, sometimes obscurely mucronate, coriaceous, glabrous; lateral nerves obscure, midrib impressed above, prominent beneath; base narrowed into a short petiole, about .08 in. long; peduncles usually 2-fid, from old wood below the leaves or sometimes terminal; bracts lanceolate; pedicels pilose, dilated at the apex. *Calyx* pilose outside, obconic, campanulate, .2-.3 in. long; segments lanceolate, subulate, .09-.12 in. long. *Corolla* slightly curved, about 1.5 in. long, purple red, tubular, widening upwards, thinly pilose when young, transverse veins absent; lobes short, .18 in. long, triangular, acute. *Stamens* 1-2 in. long; filaments about .8 in long, margined; anthers minutely granulose, beaked; beak about .4 in. long, with a fixed bifurcated posterior process near the base; style elongate, cylindric; stigma capitate. *Fruit* not seen.

LAKHIMPUR (U. Kanjilal's No. 4090)

Flrs. 4.

16. *Agapetes pilifera* Hk. f.

A shrub; branches slender, round, whitish, sparsely hairy. *Leaves* 2.5-3 by 1-1.5 in., ovate or elliptic, cordate, acuminate, entire, membranous, usually glabrous; base rounded; petiole .16 in. long. *Flowers* fascicled on a short peduncle about .5 in. long; pedicels slender, hairy, about 1 in. long. *Calyx-teeth* broad-acute, rather blunt. *Corolla* .3-.4 in. long, divided down to half way; lobes broad; anthers spurred on the beak.

KHASI HILLS, MISHMI HILLS—ascending up to 4,000 ft.

Agapetes nana *Hk. f.*

A small epiphytic; stem thick, tube-like. *Branches* thick, glabrous. *Leaves* 3·5 by 1 in., lanceolate, narrowed at both ends, entire, coriaceous, glabrous; petiole ·05-·2 in. long. *Flowers* in axillary corymbs or from old wood; peduncles up to ·75 in. long; pedicels ·2-·3 in. long, epicalyx usually 10-fid.; bracts minute. *Calyx-teeth* ·12 in., lanceolate, glabrous. *Corolla* ·25-·3 in. long; lobed nearly to the base.

NAGA HILLS, Griffith (Kew No. 3473).

Agapetes marginata *Don.*

An epiphytic shrub with tuberous root 1 ft. long and 5 in. diameter, fusiform. *Leaves* 6-8 by 3-4 in., obovate or elliptic-oblong, bluntly, shortly acuminate, entire, coriaceous, glabrous; lateral nerves numerous, prominent beneath, anastomosing into distinct intramarginal nerve; base somewhat auriculate, sessile. *Flowers* in racemes, alternate; bracts small, triangular. *Calyx* ·5 in., divided nearly to the base; segments 5, linear-oblong, acute or lanceolate, pubescent. *Corolla* 1·5 in. long, tubular, glabrescent, veined outside. *Stamens* 10 on the base of the corolla; anthers granular. *Ovary* globose, ·1 in. across.

N.-E. F. TRACT (3,800-5,100 ft.) Burkills No. 36340.

Agapetes nutans *Don.*

An epiphytic with very swollen root stock, pendulous. *Leaves* 3·5-5·5 by ·3-·4 in., linear-lanceolate, acuminate, obscurely toothed towards the apex, otherwise entire, coriaceous, glabrous; lateral nerves obscure, midrib conspicuous; base narrowed into the petiole ·1-·2 in. long. *Flowers* crimson in few fld. (3) umbels; peduncle pubescent, ·2 in. long; pedicels ·5 in., bracts linear, acicular, ·1 in. long. *Calyx* deeply cleft; segments ·2 in., linear-lanceolate. *Corolla* ·9 in. long, glabrous, crimson; lobes green tipped; apex somewhat exserted. *Stamens* 10 on the base of the corolla; pollens granular. *Ovary* globose, ·1 in. across.

N.-E. F. TRACT (5,000 ft.) Burkill's No. 36347.

Flrs. 1.

Agapetes racemosa *Watt.*

Branches lenticelled. *Leaves* 2·5-3·5 by ·7-1 in., elliptic-lanceolate, entire, long-tailed, coriaceous, glabrous; midrib prominent; lateral nerves inconspicuous or irregular; petiole short; racemes axillary, 15-30 fld., 2-3·5 in. long; peduncle rather stout; pedicels ·3-·6 in. long, slender. *Calyx* about ·1 in. long; teeth broadly subulate, sharply pointed. *Corolla* tube 1-1·3 by ·1-·6 in.; lobes ·25-·3 in. long,

slender. *Fruit* .2-.25 by 1.5-2 in., generally surmounted with the remains of the corolla lobes.

Shillong, Jowai, Kohima.

Flrs. 11-4. Fr. 3-4.

Agapetes Mannii Hemsl.

A small dense shrub, often epiphytic; branches slender, brownish, somewhat hispid. *Leaves* 6-9 in. long, lanceolate, spathulate, obtuse, coriaceous, glabrous; nerves obscure or inconspicuous. *Flowers* whitish-green, 7-8, linear, long, pendulous; peduncles solitary. *Calyx* subcarnose, sparsely puberulous, cup-shaped; teeth 5, acute. *Corolla* lobes short, obtuse, recurved. *Stamens* 10; filaments hirsute; anthers doubly spurred on the back, somewhat curved; style short, exserted. *Fruit* unknown.

KHASI HILLS.—Gustav Mann.

(No specimen in India, Hemsl. in Gart. Chorn 1892 XII 864).

Agapetes manipurensis Wall. Mss. *Leaves* similar to above. *Flowers* in few flowered corymbs. *Corolla* .3 in. long.

(Brandis Indian Trees p. 405. No specimen in Forest herbarium).

Agapetes discolor Clarke.

A small shrub. *Leaves* 1.2-2 by .4-.6 in., elliptic-lanceolate, acute, distantly toothed, coriaceous, pale beneath; base narrowed in to a short petiole about .1 in. long. *Flowers* solitary or in twos; pedicels .6 in. long, cup-shaped at the top. *Corolla* red, about .5 in. long, campanulate.

AKA HILLS (No. 15739).

Flrs. 6.

2. PENTAPTERYGIUM Klotzsch.

Pentapterygium rugosum Hk. f. Vern. Soh-pydung-synrang, Khasi.

An epiphytic shrub. *Leaves* 2.4-5 by .5-1 in., subserrate, alternate, lanceolate, distantly serrate, often with recurved margins, acute, coriaceous, glabrous, rugose; lateral nerves prominent, impressed above; base obtuse or rounded. *Flowers* greenish white, streaked purplish red in lax corymbose fascicles or solitary on the old branch; pedicels thickened, cup-shaped below the ovary. *Calyx-tube* 5-angled; segments triangular, foliaceous and accrescent in fruit.

Corolla up to 1 in. long, tubular, rosy, with transverse marks, shortly 5-lobed; beaks of anthers spurred; style slender, linear, about 1 in. long. *Berry* prominently 5-ribbed.

KHASI HILLS—ascending up to 6,000 ft. (Shillong Peak)

Flrs. 7-8. Fr. Cold season.

Pentapterygium serpens Klotz.

An undershrub; branchlets hispid; *Leaves* subsessile, bifarious, .4-.6 by .2 in., elliptic-oblong, entire; margin recurved, acute, coriaceous, glabrous; base rounded. *Pedicels* solitary or in pairs. *Corolla* bright-red with V-shaped marks, .75 in. long. *Anthers* not spurred.

AKA HILLS (No. 15740).

3. VACCINIUM Linn.

Shrubs or small trees, some species epiphytic. *Leaves* alternate or falsely whorled, usually coriaceous. *Flowers* usually small in axillary or terminal racemes, corymbs or fascicles, rarely solitary, usually 1-bracteate and 2 bracteolate. *Calyx-tube* globose; teeth 5, small. *Corolla* tubular or ovoid-campanulate, 5-lobed, white, pink or greenish, deciduous. *Stamens* 10, epigynous, free; anthers oblong, produced at the apex in 2 cylindric tubes with terminal openings. *Ovary* 5 or falsely 10-celled. *Berry* globose, 5-celled, crowned by the calyx-teeth. *Seeds* 1 or more in each cell, ellipsoid, compressed; testa firm, shining, minutely foveolate.

Leaves large, racemes solitary :—

Leaves serrate; anthers not spurred :—

Filaments hairy, bracts linear. .. 1. *V. serratum*.

Filaments glabrous, bracts elliptic. .. 2. *V. venosum*.

Leaves entire; anthers spurred. Flowers

bright-red; lateral nerves 5-7 in. long .. 3. *V. Dunalianum*.

Leaves large; racemes more or less paniced;

anthers spurred :—

Leaves 2-3 in. long; bracts lanceolate. .. 4. *V. Donianum*.

Leaves less than 2 in. long :—

Corolla white; bracts leaf-like. .. 5. *V. Griffithianum*.

Corolla pink; bracts white. .. 6. *V. retusum*.

1. Vaccinium serratum Wight. Vern. *Soh-pydung*, *Dieng-soh-lardi*, Khasi.

Usually an epiphytic shrub, about 15 ft. in. height, often straggling, with lenticellate branches, often with bud

scales persisting. *Bud* scale linear or subulate, .2 in. long. *Leaves* crowded at the ends of branches and falsely verticillate, about 1.3-5 by .4-.8 in., lanceolate, coarsely serrate, acuminate, coriaceous, glabrous; lateral nerves 10-13 on either half tapering at the base to a short petiole. *Flowers* fragrant, greenish-white, .3-.35 in. long, in second racemes, terminal and sub-terminal, glabrous, 1.5-3 in. long; bracts caducous, .1 in. long, ovate-acuminate to subulate; bracteoles minute, linear, inserted towards the base of the pedicels; pedicels whitish, gradually dilated to and jointed at the apex. *Calyx* limb very short; lobes triangular-acute, glabrous, .15 in. long. *Corolla* ovoid-oblong; lobes short; tube pubescent within. *Stamens* 10, dark-brown, epigynous, inserted round the annulate 10 grooved disc, about .2 in. long (including the anthers); filaments white, sparsely hairy, dilated at the base; anther cells minutely spinulose, produced above into slender cylindric beaks opening by terminal slits. *Ovary* globose, falsely 10-celled; ovules many. *Berry* globose, .2 in. across, opening by 5 apical slits.

K. & J. HILLS—ascending up to 6,000 ft.

Flrs. 4-5. Fr. 7.

Var. leucobotrys. Vern. *Soh-ryngkham*, *Soh-um*, Khasi.

Leaves alternate or scattered, 1.1-5 by .5-.7 in., elliptic, sharply acute, sub-entire, thinly chartaceous; base obtuse or rounded; petiole short, .1 in.

K. & J. HILLS—ascending up to 5,000 ft.

2. *Vaccinium venosum* Wight.

A stout glabrous epiphyte; branchlets usually glabrous. *Leaves* 3-5 by 1.1-5 in., lanceolate, acute or acuminate, distantly crenate-serrate, coriaceous, glabrous; lateral nerves 10-13 on either half, impressed above, prominent beneath, midrib stout; base rounded or narrowed into the petiole .0-.15 in. long. *Flowers* in glabrous racemes at the ends of branchlets (several); bracts elliptic, persistent, numerous, embracing the peduncles at the base. *Calyx-tube* harsh, glandular; teeth acute, short. *Corolla* .5 in. long, ovoid,

glabrous (puberulous, Hooker); filaments glabrous; anthers not spurred.

N.-E. F. TRACT, KHASI HILLS.

Flrs. 3.

Var. hispida-branchlets hispid, leaves smaller.

KHASI HILLS.

Flrs. 1-2. Fr. 2-3.

3. Vaccinium Dunalianum Wight. Vern. *Dieng-soh-pydung-li*, Khasi.

A large shrub or a small tree often epiphytic or straggling on rocks; branches terete when green, but angular when dry; stem white, smooth; blaze cream-coloured with brown streaks, turning brown. *Leaves* 2·5-4·5 by ·8-1·2 in., alternate, almost distichous, elliptic-lanceolate, entire, margins often recurved, caudate-acuminate (the tail upto 1 in. long), coriaceous, glabrous; lateral nerves 6-8 on either half, narrowed into a margined petiole ·1-·2 in. *Flowers* greenish-brown or pinkish in sub-umbellate racemes, axillary or terminal; racemes usually 2 in. long, enclosed in imbricate bracts when in bud; bracts ultimately deciduous, ovate, margins scarious. *Calyx* teeth small, triangular, sharply acute. *Corolla* ovoid-conic. *Filaments* glabrous; anthers spurred, dehiscing by apical slits. *Berry* globose, ·25 in. across, dark purplish when ripe.

K. & J. HILLS—ascending up to 6,000 ft.

Flrs. 4-5. Fr. 11-12.

4. Vaccinium Donianum Wight. Vern. *Dieng-jing*, *Dieng-soh-rongkham*, Khasi; *Dieng-sang*, *Dieng-soh-saryngkham*, Synt.

A small tree 25'/15'' or a shrub. *Bark* cinnamon colour, dark-brown, splitting in more or less spiral strips; blaze yellowish, turning dark-brown; wood white or cream-coloured. *Leaves* bi-farious, 2-4 by ·4-1·3 in., lanceolate or elliptic-lanceolate, sub-entire or serrulate, cordate, acuminate, sub-coriaceous, glabrous; lateral nerves 5-7 on either half,

slender; base cuneate; petiole very short .1-.2 in. *Flowers* bright red, in glabrous racemes, axillary or from below current year's leaves, sometimes paniced; pedicels .5-.6 in. long; bracts lanceolate, deciduous. *Calyx* teeth small, triangular. *Corolla* glabrous, .35 by .2 in., tubular-urceolate. *Filaments* hairy; anthers spurred at apex, opening by apical slits. *Berry* many seeded, .25 in. across, globose.

K. & J. HILLS—ascending up to 6,000 ft.

Leaves are used as vegetable, fruits are eaten.

Flrs. 4-6. Fr. 8-11.

5. *Vaccinium Griffithianum* Wight. Vern. *Soh-ryng-kham*, Khasi.

A small shrub rather gregarious along streams; young shoots pubescent; stem blackish. *Leaves* .5-1.5 by .2-.6 in., oblong or elliptic-lanceolate, sharply serrulate, acute, membranous, glabrescent above, sparsely hairy beneath, specially along the nerves; lateral nerves 5-6 on either half, obscure; base acute; petiole very short, pubescent. *Flowers* white, pubescent, often in paniced racemes; bracts large, foliaceous; bracteoles linear, often persistent in fruit; pedicels .25 in. long, pilose. *Calyx* teeth small, ovate, triangular. *Corolla* ovoid, obscurely ridged; lobes small. *Filaments* hairy; anthers prominently spurred on the beak, opening by apical slits. *Berry* globose, .17 in. across.

KHASI HILLS, common, ascending up to 6,000 ft.

Fruit is eaten.

Flrs. 4-5. Fr. 7-9.

6. *Vaccinium retusum* Hook.

A large often epiphytic shrub; branches pendent, young pubescent, sometimes drying bluish. *Leaves* .6-1.2 by .3-.5 in., obovate, obtuse, entire, coriaceous, glabrous; lateral nerves 3 on either side, obscure; base cuneate; petiole .1 in. long. *Flowers* in terminal racemes; bracts .2-.3 in. long, white, membranous, embracing the bud. *Calyx* .2 in. long, almost obscurely toothed. *Corolla* pinkish with 5 red stripes,

glabrous; lobes short. *Filaments* hairy; anthers dehiscing by split below the apex with large dorsal spurs. *Fruit* .2 in. across, sub-globose.

NAGA HILLS, MANIPUR (1,000 ft.).

Flrs. 4-5. Fr. 6.

***Vaccinium Forrestii* Diels.**

A bushy shrub on the fringe of the forest along the ridgecrest. *Flowers* cream-white, reddened at the base and with red calyx.

Mishmi, Delei Valley at Chibaon, (6,000 ft.) and LUSHAI HILLS.

Flrs. 4.

***Vaccinium bancanum* Miq.**

A shrub or tree, terrestrial or epiphytic. *Leaves* 1.5-2.5 by .75-1 in., elliptic, elliptic-oblong or obovate, usually acuminate, entire, coriaceous, glabrous; lateral nerves very fine, 4-6 on either half, rather obscure, midrib impressed above; base shortly narrowed or acute; petiole short, .1 in. long. *Racemes* pubescent, 2 in. long; pedicels .2 in. long. *Calyx* shortly 5-toothed, tomentose. *Corolla* glabrous; lobes short, somewhat blunt. *Stamens* short; anthers with short spurs; filaments pubescent. *Style* rather hirsute. *Fruit* globose, like a pea.

NAGA HILLS, (Forest Botanist, F. R. I. DehraDun)

(No specimen in Forest herbarium).

Flrs. 2-3. Fr. 6-8.

***Vaccinium Nummularia* Hk. f. & T.**

A small rigid epiphyte rooting from the branches. *Leaves* sub-sessile, .5-.6 in. long, ovate-elliptic; margins recurved, distantly serrate, spinescently acute, coriaceous. *Calyx* teeth short, pinkish. *Corolla* .2-.3 in. long, tubular, pinkish.

AKA HILLS, (No. 15742).

Flrs. 6.

4. CORALLOBOTRYS Hook. f.

***Corallobotrys acuminata* Hk. f.**

A small epiphytic shrub. *Leaves* alternate, 6-9 by 1.5-2.5 in., lanceolate, more or less obtusely serrate, acuminate, coriaceous, glabrous, green above, pale beneath; base cuneate, biglandular; petiole .3 in., marginate. *Flowers* red in corymbs on the old wood; bracts minute. *Calyx-tube* hemispheric, 5-fid; segments triangular, persistent. *Corolla*

·3 in. long, campanulate, 5 lobed, glabrous or glandular, hairy outside. *Stamens* 10, epigynous, free; anthers produced into 2 short tubes upwards, dehiscing by terminal slits. *Ovary* 5-celled; stigma capitate; ovules numerous in each cell.

LAKHIMPUR, (Dulong Reserve); KHASI HILLS—up to 5,000 ft.
Flrs. 3-5.

FAM. 77. ERICACEÆ.

Trees, shrubs or perennial herbs. *Leaves* alternate, often whorled at the ends of branches, entire or serrate; stipules 0. *Flowers* racemed, axillary or solitary; regular or sometimes slightly zygomorphic (Rhododendron). *Calyx* usually free, 5 rarely 4 or 6-fid or cleft; lobes sometimes obscure. *Corolla* hypogynous, usually campanulate, cylindric or urceolate, sometimes deeply lobed, rarely free; lobes usually 4-5, sometimes 10. *Stamens* usually 10, sometimes 5, 8 or up to 20, hypogynous or slightly attached to the base of the corolla; filaments free; anthers oblong; cells often with projecting appendages, usually opening by terminal pores or short slits. *Ovary* usually superior, 4-5-many celled; style slender; stigma capitate, peltate or shortly lobed; ovules many, rarely few on axile placenta. *Fruit* a 5-valved loculicidal or septicidal capsule, sometimes enclosed in succulent calyx. *Seeds* usually many, rarely few in each cell.

- I. Capsule dehiscing loculicidally; corolla less than ·5 in. long, ovoid-urceolate or tubular :—

Calyx in fruit, succulent and enlarged, surrounding the capsule; anther cells with two apical setaceous horns on the back.

1. *Gaultheria*.

Calyx in fruit unaltered; filaments produced into two horns at the apex.

2. *Pieris*.

- II. Capsule dehiscing septicidally; corolla more than 5 in. long, showy, campanulate; filaments or anthers without any appendages. 3. **Rhododendron.**

1. GAULTHERIA Linn.

Evergreen erect or procumbent shrubs. *Leaves* alternate, serrate or serrulate. *Flowers* small, sometimes dimorphic, racemose or solitary, bracteate, 2-bracteolate. *Calyx* ovoid, 5-lobed, enlarged, succulent, coloured and almost enclosing the capsular fruit. *Corolla* ovoid-urceolate, greenish white or reddish; teeth small, recurved. *Stamens* 10; filaments more or less dilated and attached to the base of the corolla, pilose; anther cells dorsally 1-2 horned at the apex; in the dimorphic flowers stamens small; anthers simple. *Ovary* 5-celled; style cylindric; stigma simple; ovules many in each cell. *Capsule* 5-celled, loculicidally 5-valved from the apex. *Seeds* many, minute, subglobose, obtusely angled.

Erect shrub, leaves more than 2 in. long, glabrous; flowers in racemes. 1. *G. fragrantissima*.
Procumbent under-shrub, leaves under 1 in. long, undersurface setaceous; flowers solitary. 2. *G. nummularioides*.

1. Gaultheria fragrantissima Wall. Vern. *Jirhap*, *Jirhapiong*, *jirhap-kynthai*, *Soh-ling-thrait*, *Jar-ling-thrait*, Kh.

An evergreen shrub up to about 12 ft. in height with thin brownish bark. *Branchlets* margined along the insertion of the leaves, glabrous. *Leaves* 5·2 by 1·2·5 in., faintly aromatic and smelling of methyl salicylate (oil of wintergreen) when bruised, oblong-lanceolate to elliptic-lanceolate or elliptic-rhomboid, acute or acuminate, serrate or serrulate, serratures often ending in minute deciduous setæ, stiffly coriaceous, glabrous and dark green above, paler and punctate with black dots below, nerves impressed above, secondary nerves arcuate, 3-4 on either half, the uppermost two converging to the apex, tertiaries subparallel; base narrowed, sub-acute, cuneate or rhomboid; petiole ·25·5 in. long, channelled, often tinged with red. *Flowers* ·15·2 in. long, white, usually ultimately secund in pubescent or puberulous

axillary, racemes .5-3 in. long; bracts .05-.1 in. long, broad-ovate or oblong, sub-acute or acute; pedicels usually exceeding the bracts up to .25 in. long; bracteoles small, opposite towards the top of the pedicel, concave, ovate-acute or obtuse. *Calyx* white, .1 in. long, deeply 5-lobed; lobes ovate, lanceolate, acute, sometimes sub-acute, ciliate. *Corolla* about .15 in. long, ovoid, urceolate; teeth very small, reflexed. *Stamens* 10; filaments attached to the base of the corolla, dilated towards the base, pilose; anthers red when young, each cell with two apical setaceous horns on the back. In dimorphic flowers—*stamens* small and anthers (sterile?), without projections. *Ovary* deeply 5-grooved, 5-celled, pubescent at the top; base glabrate and 10 glandular; ovules many in each cell, deep pink. *Capsule* 5-celled, loculicidally 5-valved from the apex, subglobose, .2 in. across, pubescent, completely surrounded by the deep blue accrescent calyx.

KHASI HILLS, 5,000-6,000 ft. in cool situation.

Similar oil to that obtained from Canadian Wintergreen (*G. procumbens*) could be distilled from the leaves to which it is reported to be superior in therapeutic properties. Both salicylic acid and carbolic acid of great purity could be obtained from this oil.

Flrs. 3-5. Fr. 5-7.

2. *Gaultheria nummularioides* Don.

A prostrate undershrub with densely hirsute stems. *Leaves* .3-.5 by .25-.4 in., broad, ovate-acute, glabrous above, setulose beneath and on the margins, base of the bristles glandular, nerves rather indistinct, 2-4 on either half, arched and forming loops near the margin; base rounded or cordate; petiole minute, setose. *Flowers* .25 in. long, pink or white, axillary, solitary; pedicels .1 in. long, densely clothed with small glabrous ovate-oblong bracts. *Calyx-teeth* lanceolate. *Corolla* tubular, urceolate; teeth minute, recurved. *Capsule* enclosed by blue-black succulent, calyx both together, .3 in. across.

KHASI HILLS, 6,000 ft.

Dumpep; Laitlyngkot gorge, locally abundant.

Gaultheria Griffithiana Wight.

A shrub with terete branches. *Leaves* 4-7 by 1.2-2 in., elliptic or elliptic-lanceolate, caudate-acuminate, closely serrate, coriaceous,

glabrous, midrib stout, depressed above, punctate below; main lateral nerves usually 4, with a few shorter ones between and also within the last pair of very arched nerves; petiole .2-.3 in. long, margined. *Racemes* axillary, 3-3.5 in. long, 15-25-fid; pedicels .25 in. long; bracts .1-.15 in. long, ovate; bracteoles ovate, usually distant from the ovary, often below the middle of the pedicels. *Calyx* teeth obtuse. *Corolla*, stamens and fruit as in *Gaultheria fragrantissima*.

Hardly separable by any constant character from *Gaultheria fragrantissima*.

NAGA HILLS, Clarke (!) Watt (!); KHASI HILLS.

***Gaultheria codonantha* Airy-Shaw.**

A large bushy shrub. *Branches* slightly bending, sub-slender, subterete, wide, spreading, ferruginous-setose. *Leaves* distichous, 2.4 by .9 in., sometimes 7 by 6 in., ovate, elliptic-ovate or lanceolate, acute or acuminate, margin somewhat revolute, shortly toothed, chartaceously coriaceous, glabrescent; nerves impressed above, prominent beneath; base 5-nerved, shallow, cordate or truncately rotundate; petiole robust, .2-.4 in. long, more or less ferruginous-setose. *Inflorescence* axillary, shortly racemose or corymbose, 4-7 flowered; rachis .2-.6 in. long; bracts rather ashy velvety. *Flowers* cream in bud, banded with red (often) when fully open large; buds ovoid, conic. *Calyx* shortly cupular, about .5 in. across; segments 5, deltoidly ovate, .12-.17 in. long, minutely somewhat ashy tomentose. *Corolla* campanulate, about .7 in. long; lobes broadly deltoid, about .33 in. long. *Stamens*—filaments subulate, .11-.17 in. long; anthers lanceolate-oblong, .17-.2 in. long, .4 in. broad; base rounded, dorsifixed. *Ovary* depressed, globose, 5 or 6 locular; style columnar, about .34 in. long; stigma truncate; ovules numerous, angulate. *Fruit* not seen.

(Hooker's *Icones Plantarum*. Vol. III, part I, 1933 or Vol. xxxiii of the entire work).

ASSAM, Delei valley, about 5,000 ft.

(F. Kingdon Ward No. 8024).

Flrs. 4.

2. PIERIS D. Don.

Trees or shrubs. *Leaves* alternate, entire or serrulate. *Racemes* axillary or paniced at the end of the branches, bracteate and 1-2 bracteolate. *Calyx* 5-fid or partite. *Corolla* ovoid or oblong-urceolate; lobes 5, short, recurved. *Stamens* 10; filaments usually with 2 divaricate horns at the apex. *Ovary* 5-celled; style cylindric, stigma capitate; ovules many in each cell. *Capsule* globose, loculicidally 5-valved. *Seeds* many, linear-oblong.

Deciduous; leaves entire; racemes usually not
 paniced. 1. *P. ovalifolia*.
 Evergreen; leaves serrate; racemes usually
 paniced. 2. *P. formosa*.

1. *Pieris ovalifolia* D. Don. *Vern. Diengla samiang, Jarahap, Kh.*

A small often crooked deciduous tree, sometimes only a bushy shrub with blackish brown deeply longitudinally fissured fibrous bark, dead portion up to 1 in. thick; blaze brown. *Young parts* usually pubescent, soon becoming more or less glabrous. *Leaves* 2·5-6·5 by 1·3 in., ovate, oblong-lanceolate, elliptic-oblong or elliptic, acute or acuminate, entire, coriaceous, glabrous, undersurface often pilose; lateral nerves prominent beneath, 8-11 on either half; base rounded; petiole ·15-·5 in. long. *Flowers* ·3-·4 in. long, close together, secund and drooping on terminal and axillary pubescent or puberulous racemes sometimes a few flowers solitary on upper leaf axils or falsely paniced by early fall of leaves; racemes ordinarily 1·5 to 6·5 in., some forms up to 9 in. long; bracts linear, lanceolate or ovate, acute, ·1-·2 in. long, caducous; bracteoles small, linear-oblong; pedicels ·1-·15 in. long, pubescent. *Calyx* connate at the base, triangular-lanceolate or ovate, more or less pubescent, about ·1 in. long. *Corolla* elongate, ovoid, pubescent outside, puberulous within; lobes short, recurved. *Filaments* white, broad, and woolly at the base and slender above with two divaricate setaceous horns at the apex; anther cells ovoid, opening by terminal pores. *Ovary* globose; style cylindric, about as long as the corolla. *Capsule* ·2 in. across, globose, supported by the persistent calyx. *Seeds* many, minute, linear, oblong or falcate.

KHASI & JAINTIA HILLS. Commonly associated with *Pinus Khasya*, from 3,500 ft. upwards.

The young leaves are poisonous to cattle. The wood is worthless as it shrinks and warps in seasoning. It is also a bad fuel as it is difficult to light and only smoulders.

Flrs. 5-8. According to locality. Fr. 9-10. Leafless for a short time in winter.

1. Var. *lanceolata* F. B. I. Leaves often small, narrower, sometimes only ·6 in. broad; base narrowed, often a bush.

2. Var. pubescens. Leaves pubescent on the upper surface along nerves; racemes lax, 5-9 in. long; filaments slender.

KHASI & JAINTIA HILLS—Borpani.

2. *Pieris formosa* D. Don.

A small evergreen, glabrous tree. *Leaves* 3-6 by .8-1.2 in., elliptic, acuminate, very finely and regularly serrate, coriaceous, glabrous; lateral nerves about 12 on either half, fairly strong but obscure and irregular; tertiaries strongly reticulate; midrib prominent on both surfaces. *Flowers* white, about .3 in. long, nodding, in terminal panicked racemes; pedicels .2-.3 in. long, bracteolate. *Corolla* .25 in. long. *Filaments* 2 horned at the apex. *Capsule* .2 in. across, globose.

KHASI HILLS (Brandis).

Flrs. 5.

Craibodendron Mannii Smith.=C. Henryi W. W. Smith.

An imperfectly known plant. The species is based on a specimen collected by Gustav Mann from Jowai Road. It had been named *Leucothoe Mannii*, King & Prain Mss. in Calcutta Herbarium. Smith founded the genus *Craibodendron* and in notes of the Royal Botanic Garden, Edinburgh, Vol. XXIV, p. 157-160, 1912, he mentions that the present species should be brought under the genus on account of its close similarity to *C. Henryi* Smith. The genus *Craibodendron* is allied to *Pieris* and *Leucothoe*. Its characters are briefly as follows :—

Small trees with alternate entire leaves. *Flowers* small in terminal panicked racemes; pedicels short, bracteate and 2-bracteolate. *Calyx* deeply 5-partite; bases slightly imbricate in bud, persistent. *Corolla* narrowly campanulate, with 5 erect teeth. *Stamens* 10, included; anthers dorsally muticous. *Ovary* globose, 5-locular; ovules many on axile placentas. *Capsule* depressed, globose, 5 lobed or angled, 5 locular. *Seeds* pendulous, comparatively large, rather few, unilaterally winged.

3. RHODODENDRON Linn.

Trees or shrubs, often scaly or aromatic, usually having large winter buds covered with scales. *Leaves* alternate, often crowded together towards the ends of branches, entire, coriaceous. *Flowers* fascicled or subcorymbose, terminal, rarely solitary or axillary; bracts broad, generally caducous;

bracteoles linear. *Calyx* 5-lobed, sometimes small or obsolete, persistent. *Corolla* campanulate, widely funnel-shaped or cylindric; tube long or short; lobes 5-10. *Stamens* usually 10, sometimes 5 to 18; anthers oblong, dehiscing by terminal pores. *Ovary* 5-20 celled, usually 5-celled; style long or short; stigma capitate; ovules many in each cell. *Capsule* short and woody or elongate and thinner, septicidal, valves breaking away from the placentas. *Seeds* many, albuminous; testa often loose, margined, tailed or crested.

Flowers deep red :—

Trees. 1. *R. arboreum*.

Flowers white, often tinged with pink :—

Shrub or small tree. 2. *R. formosum*.

1. *Rhododendron arboreum* Sm. Vern. *Tin-saw*, *Dieng-tin-thuin*, *Dieng-tiw-thuin*, Kh.; *Burans*, Nep.

A medium sized or small evergreen tree. *Bark* reddish brown, corky, peeling off in small flakes; blaze reddish brown or pinkish with white lines; branchlets glabrate; buds viscous; young parts, pedicels and calyx covered with sticky waxy glands. *Leaves* crowded at the ends of branches 3-6 by .75-1.75 in., narrow elliptic or oblong-lanceolate, acute, margins recurved, coriaceous and hard, glabrous, with nerves deeply impressed above, undersurface matted with minute buff or greyish waxy scales with hair-like branches, making it appear tomentose or silvery; main secondary nerves prominent beneath, 12-18 on either half, looping near the margin; base narrowed, obtuse to sub-acute; petiole .3-.7 in. long, dilated at the base, often tinged with red. *Flowers* red, usually deep scarlet, crowded at the ends of branches in corymbose fascicles; bud scales .3-.6 in. long, suborbicular, acute, brownish, concave; bracts membranous, silky, spathulate, apiculate, margins ciliate, 1-1.2 in. long; pedicels .2-.4 in. long. *Calyx* subrotate; lobes unequal, about 1 in. long, acute. *Corolla* campanulate, 1.2-1.5 in. long, slightly zygomorphic, with 5 slightly saccate infoldings at the base; lobes unequal, imbricate and crumpled in bud, emarginate at the apex, margins sinuate; tube often black spotted inside. *Stamens* 10, declinate, unequal, alternately long, anterior 5 longest; filaments subulate, reddish at the

base. *Ovary* white or grey, woolly, .15 in. long, with a purple line at the base, usually 10 ribbed, 10 celled, (7-9 according to some authorities) with a false dissepiment between each, about 1.5 in. long, tinged with red; stigma dilated. *Capsule* 1 in. long, cylindrical, longitudinally ribbed and curved, mealy. *Seeds* ellipsoid, minute.

KHASI HILLS, 5,000-6,000 ft. in cool situations.

Wood brownish or reddish white, close grained, seasons badly. The flowers are used in the form of a paste for obstinate cases of dysentery in Hindu medicine.

Flrs. 3-4. Fr. Autumn and cold season.

2. *Rhododendron formosum* Wall. Vern. *Tiw-lah*, *Diengtiw-lih*, *Sillong-phumit*, *Tiw-shyllong-phut-miet*, *Dieng-soh-tiw-thlong*, Kh.

A branchy shrub, usually 3-5 ft. high, exceptionally upto 8 ft. with brown smooth stems; young shoots setose and thickly dotted with minute round, glandular scales. *Leaves* 1.2-3 by .3-.7 in., narrow-oblong, acute, sub-acute or apiculate and ending in a somewhat blunt point, coriaceous, glabrate with age above, persistently scaly beneath, margins long ciliate at least when young; nerves impressed above, secondaries indistinct, tertiaries finely reticulate and distinct on the upper surface; base narrowed to the short scaly and more or less setose ciliate petiole or sometimes sub-sessile. *Flowers* in dense terminal corymbs of 2-5, faintly scented, white or tinged with pink, covered with scales in bud; bud scales .2-.5 in., sub-orbicular, broad-ovate or oblong-obovate, minutely ciliate; bracts .8-1 in. long, spatulate, membranous; pedicels .3-.6 in. long, stout, dotted with glandular scales. *Calyx* about .2 in. across, oblique; lobes unequal, anterior obscure, posterior obtuse or rounded, ciliate. *Corolla* broadly campanulate, 1.5-2.5 in. long by 1.5-3 in. across; tube upto 1.5 in. long, often tinged with red or greenish-yellow; lobes 5, slightly unequal, anterior largest with a blotch of spotted yellow or pink inside. *Stamens* 10, unequal usually, alternately long, posterior smallest; filaments slightly declinate, villous on the lower half. *Ovary* glandular, scaly, about .2 in. long, constricted at the top, longitudinally 5-ridged;

base with projecting glands between the bases of the filaments 5-6 celled; style declinate, exceeding the stamens, dotted with scales towards the base; stigma dilated. *Capsule* oblong, .5-.6 in. by .25 in., rugose. *Seeds* .05 in., acute at both ends shortly tailed.

KHASI & JAINTIA HILLS, 5,000-6,000 ft. Common along water courses.

Flrs. 3-4. Fr. 9.

***Rhododendron inæquale* Hutchinson.** Nov. Sp. Notes of the Royal Botanic Gardens, Edinburgh, Vol. XII. *R. formosum* Wall. Var. *inæqualis* C. B. Clarke.

A large branchy shrub or a small tree in favourable situations. *Bark* grey, rough, becoming smoother and reddish-brown in old plants, exfoliating in flakes; young parts, undersurface of leaves, bud scales, pedicels and calyx dotted with round scales; young shoots sparingly strigose. *Leaves* 2.4-4.5 by 1-1.7 in., elliptic-oblongate or lanceolate to oblong, shortly acuminate or acute, coriaceous, margins slightly recurved, upper surface glabrous with age; lateral nerves 6-11 on either half, impressed above, rather indistinct when green; base sub-acute or acute; petiole .3-.6 in. long, grooved on the upper side. *Inflorescence* subumbellately corymbose, 2-6 flowered. *Flowers* white, very handsome, sweet scented; bracts caducous, upto 1.3 in. long, spatulate, ciliate with short soft hairs; pedicels stout, .2-.5 in. long. *Calyx* saucer-shaped, very oblique, .4 in. across; lobes obscure, unequal, rounded, ciliate. *Corolla* pure white, thinly dotted with scales, outside even when fully developed, 2.8-3.2 by about 4 in. across; tube with 5 pits outside near the base; lobes unequal, posterior largest, 1.25-1.6 in. long, and blotched with yellow inside. *Stamens* 10, unequal, posterior most shortest; filaments slightly declinate, subulate, lower third villous. *Ovary* .3-.4 in. long, closely lepidote, oblique, constricted at the top, ribbed, 6-celled; style exceeding the stamens, 3-3.5 in. long, declinate, thinly scaly on the lower half; stigma dilated, broad. *Capsule* very oblique, .8-1.2 in. by .4 in., densely lepidote, crowned by the remains of the style. *Seeds* .1-.12 in. long, lanceolate-acute, shortly tailed at the base.

KHASI & JAINTIA HILLS, 5,500-6,000 ft. Laitlyngkot, Kyllang Rock, Serarim, Ryat Laban, etc., not common.

Flrs. 3-4. Fr. 12-1.

Very closely allied is *Rhododendron Veitchianum* Hk. f. which has been recorded from Lushai Hills. It differs mainly by its 5-celled ovary and straight capsule.

Rhododendron iteaphyllum *Hutchinson*, Nov. Sp. Notes of the Royal Botanic Gardens, Edinburgh. Vol. XII. P. 83. *R. formosum* *Wall.* Var. *salicifolium* C. B. Clarke.

A branchy shrub; branchlets densely leafy, shoots densely lepidote with round scales and sparingly setose, pilose. *Leaves* 2.3-5 by .27-.6 in., linear or linear-oblongate, narrowed to an acute base, which is decurrent on the short petiole, apex sub-acute or acute, chartaceous, slightly ciliate on the margins when young, thinly lepidote and sometimes a little setose above, more densely scaly beneath; lateral nerves obscure; petiole .2-.4 in. long, ciliate, deeply grooved above, scaly. *Inflorescence* terminal, subumbellate, about 3-flowered; bud scales fringed with short hairs, not or slightly lepidote; pedicels densely scaly. *Calyx* not or scarcely lobed, scaly outside. *Corolla* white, about 2-2.5 in. long, sparingly scaly. *Stamens* 10, a little exserted. *Ovary* usually 6-celled, densely lepidote; style thinly scaly on the lower half. *Capsule* straight, about .6 in. long, crowned by the base of the style. *Seeds* .08 in. long, shortly tailed at one end.

KHASI HILLS in similar situations as *R. formosum*.

Both *R. inæquale* and *R. iteaphyllum* are connected by intermediate forms with *R. formosum*. The extreme forms are quite distinct. From a close observation of all the three forms in the field I am inclined to think that these are either varieties of the same plant, or hybrids or two or three closely allied species which have interbred freely. C. B. Clarke in *F. B. I.*—as has already been mentioned has reduced *R. inæquale* and *R. iteaphyllum* to varieties of *R. formosum*. The following is a key for separating the three forms:—

Leaves not linear, usually over .6 in. broad:—

Capsule straight or slightly oblique at the base, .6-.8 in. long, margins of leaves ciliate. *R. formosum*.

Capsule very oblique at the base, .8-1.2 in. long, leaves not ciliate on the margins. *R. inæquale*.

Leaves linear, usually less than .6 in. broad:—

Capsule more or less straight. *R. iteaphyllum*.

R. inæquale is the most robust form with larger and broader leaves than the others, and delightfully scented flowers.

Rhododendron manipurense *Balf-et Wall.*

A much branched tortuous tree or shrub; young parts lepidote. *Leaves* up to 7 by 3 in., elliptic or oblong-elliptic, sometimes obovate, more or less rounded and mucronate at the apex, coriaceous and thick, shining above, densely lepidote beneath, the scales contiguous or nearly so, from small and brown to large and black; lateral

nerves about 10 on either side; petiole wide, up to about 1 in. long, densely lepidote. *Flowers* pure white, 4-5 together, subumbellate at the ends of branches; flower buds large, ovoid, the outer scales thick; pedicels about .4 in. long, stout, lepidote. *Calyx* .6 in. long, 5-lobed to near the base; lobes sub-equal. *Corolla* up to 4 in. long; tube rather narrowly funnel-shaped, longer than the lobes, lepidote outside; lobes 5, rounded. *Stamens* exserted. *Ovary* densely scaly; style scaly nearly to the apex; stigma lobulate, disk-like. *Capsule* .8-1.5 in. long, scaly, crowned by the remains of the style.

NAGA HILLS, 8-10,000 ft. Japvo, Watt; MANIPUR, Watt.

R. Maddeni *Hk. f.*

A much branched shrub; branches with pale papery bark; branchlets not hairy. *Young parts* scaly. *Leaves* 3-6 by 1-2.5 in., lanceolate or oblong-lanceolate to elliptic, shortly but sharply acuminate, firmly coriaceous, ultimately glabrous above, closely punctate-lepidote beneath with contiguous or very close reddish brown scales, which ultimately fall off; petiole .6-1 in. long, closely punctulate with remains of the scales. *Flowers* white, usually up to 5 (according to Brandis 4-12) together; bud scales minutely downy; pedicels .5-.6 in. long, closely lepidote. *Calyx* 5-lobed; lobes very unequal. *Corolla* up to 4 in. across; tube 1.5-1.8 in. long, slightly broader upwards, lepidote outside; limb 5-lobed. *Stamens* 20, as long as the corolla tube; filaments glabrous. *Ovary* 10-celled; style a little extruded, scaly. *Capsule* .8-1 in. long.

MANIPUR—Watt: NAGA HILLS (Japvo) 8000-10,000 ft.

Flrs. 7.

R. Eliottii *Watt mss. ex Brandis*—Smith in Notes of the Roy. Bot. Gar., Edinburgh. Vol. VIII, p. 214-15.

A small much branched tree. *Leaves* 2.75-5.5 by 1-2.2 in., elliptic-oblong, apiculate, coriaceous, glabrous and shining above, pale and with finely reticulate nervules beneath; petioles stout, .6-1 in. long. *Flowers* rose purple, with deeper coloured spots on the petals, 10-15 together in corymbs, not scented; pedicels about .4 in. long, minutely glandular. *Calyx* broadly cupular, persistent. *Corolla* about 2-2.25 in. long, broadly funnel-shaped. *Stamens* 9-10, unequal; anthers deep brown. *Ovary* stellate-tomentose. *Capsule* oblong, .6-.8 in. long, at first rusty tomentose, ultimately glabrescent, 6-valved.

NAGA HILLS, 9-1,000 ft. Japvo, Watt! C. B. Clarke!

Flrs. 5.

R. Macabeanum *Watt. mss. ex Balfour* in Notes of the Roy. Bot. Gar., Edinburgh. Vol. XII. P. 128-129.

A short stemmed branchy tree. *Leaves* about 11 by 7 in., oblong-elliptic, apex rounded, emarginate with a stiff mucro, dark green and

glabrescent above, undersurface at first greyish white, with interlacing hairs, often nearly black afterwards; petiole about 1 in. long, more or less tomentose. *Flowers* pale-yellow or yellowish white, very many together in a compact umbel; pedicels about .6 in. long, tomentose, eglandular. *Calyx* almost obsolete, irregularly lobulate, tomentose. *Corolla* tubular, campanulate from a narrow base, about 2 in. long. *Stamens* 16, shorter than the corolla; filaments glabrous; anthers brown. *Ovary* tomentose; style glabrous, slender. *Capsule* slightly curved, about 1.5 in. long, more or less tomentose, dehiscing into 4 valves each having 4 chambers.

Jakpho (Japvo?). NAGA HILLS, 8,000-9,500 ft. King.

The following species also are recorded by Dr. N. L. Bor, *I.F.S.*, from Piri Hills (Balipara Frontier Tract, Darrang District) above 7,000 ft.

- R. *Falconeri* Hk. f.
- R. *barbatum* Wall.
- R. „ Var. *Smithii* Nutt.
- R. *Dalhousiæ* Hk. f.
- R. *Hodgsoni* Hk. f.
- R. *Keysii* Nutt.
- R. *Setosum* D. Don.
- R. *cinnabarinum* Hk. f.
- R. *grande* Wight.
- R. *bauhiniflorum* Watt (Naga Hills).
- R. *vaccinioides* Hk. f.
- R. *Parryæ* Hutch. (Lushai Hills).

***Pyrola rotundifolia* Linn. Sub. sp. indica Andres.**

A perennial glabrous herb. *Leaves* 1.5-1.8 by 1-1.3 in., orbicular, ovate or broadly ovate-entire, usually obtuse, glabrous; base obtuse or cuneate; petiole .8-1 in. long. *Flowers* in long scapigerous raceme, about 6 in. long. *Calyx* 5 lobed, persistent. *Corolla* lobes 5, deciduous, white and pink (*F B. I.*). *Stamens* 10, hypogynous. *Capsule* .2-.3 in. across, subglobose.

KHASI AND JAINTIA HILLS. (5,000 ft.)

Flrs. & Fr. Hot season.

FAM. 78. PLUMBAGINACEÆ.

Perennial herbs, undershrubs or shrubs. *Leaves* alternate, entire, usually fleshy, sometimes radical and rosulate, exstipulate. *Flowers* hermaphrodite, regular, pentamerous in terminal scapes or peduncles, capitate, racemed or paniced; bracts rigid with scarious margin; bracteoles 2. *Calyx* inferior, gamosepalous, often tubular, 5-10 ribbed, usually scarious, persistent. *Corolla* hypogynous, salver-shaped. *Petals* free or connate at the base or united in a linear tube. *Stamens* 5, opposite the petals or corolla lobes; filaments nearly free or adnate to the base of the corolla; anthers oblong. *Ovary* superior, 1-celled, 5-angular above; ovule 1, pendulous from a long basal funicle; style 5, free, more or less connate, bilobed. *Capsule* included within the calyx, membranous below, 5 valved and hardened above. *Seed* cylindric; albumen fleshy or 0; embryo straight, radicle superior.

PLUMBAGO Linn.

Leaves alternate, entire, amplexicaul; petiole often auricled at the base. *Flowers* spicate. *Calyx* tubular with stalked glands. *Corolla-tube* slender, long; lobes spreading. *Stamens* free, hypogynous; filaments dilated at the base. *Ovary* attenuated at the apex into a slender style with 5 stigmatose branches. *Capsule* membranous, ultimately circumsciss near the base.

Flowers white. Leaves ovate, abruptly cuneate and running into the margined petiole; base of style glabrous.

1. *P. zeylanica*.

Flowers bright red. Leaves elliptic, gradually tapering into the petiole; base of style hairy.

2. *P. rosea*.

Flowers blue. Leaves sub-verticillate. (cultivated).

3. *P. capensis*.

1. *Plumbago zeylanica* Linn. Vern. *Agiasi*, Miri; *Chitrika*, Sanskrit.

An undershrub with glabrous small herbaceous branchlets. *Leaves* 1·5-4·5 by ·8-2·2 in., ovate-acute, entire;

lateral nerves rather obscure; base abruptly cuneate and running into the margined petiole, which is amplexicaul and sometimes auricled at the base. *Flowers* white, .5-1 in. long, sub-sessile in glandular pubescent terminal or axillary spicate racemes, which are 2-6 in. long; lower bracts leafy; bracteoles ovate-acuminate, shorter than the calyx. *Calyx* free, tubular, covered with shortly stalked glands, persistent. *Corolla* hypocrateriform; lobes oblong, apiculate; filaments equalling the corolla lobes; anthers purple. *Capsule* oblong, apiculate, splitting upwards into 5 valves.

N. E. FRONTIER TRACT.

The root is used in medicine. It is said to be useful for dyspepsia, piles, diarrhoea and skin diseases. It is believed to be caustic and vesicant.

Flrs. April, often later in August & September. Fr. Cold season.

2. *Plumbago rosea* Linn. Vern. *Agechhit*, Ass., *Rakta-chitrika*, Sans.; *Rakti chita*. Beng.

A rambling perennial herb resembling *P. Zeylanica*. *Leaves* 1-4 by .5-2 in., elliptic, tapering to a short petiole. *Rachis* of spike glabrous. *Flowers* bright red. *Base* of style hairy.

SIBSAGAR, GOALPARA, also in SYLHET (R. N. De) often cultivated.

It is considered abortifacient and vesicant by Sanskrit and Muhammadan writers. The milky juice is useful in ophthalmia and also as an external application for scabies (*I. M. Plants*).

Flrs. 2., often throughout the year.

3. *Plumbago capensis* Thunb. has blue flowers and subverticillate leaves and is often cultivated in gardens.

FAM. 79. PRIMULACEÆ.

Herbs perennial, rarely annual. *Leaves* all radical or radical and cauline, exstipulate. *Flowers* bisexual, regular, sometimes dimorphic. *Calyx* inferior, 5 (rarely 4-9) cleft. *Corolla* usually hypogynous, rotate, bell or funnel-shaped, 5-lobed. *Stamens* on the corolla-tube opposite the lobes, sometimes with alternating staminodes. *Ovary* 1-celled; stigma undivided, often capitellate; ovules many, amphitropous on a free central placenta. *Capsules* dehiscent transversely or by valves. *Seeds* few or many, usually angular often sunk in the placenta, albumen fleshy or horny, embryo transverse.

Ovary superior :—

Corolla lobes imbricate; tube conspicuous and long.

1. **Primula.**

Corolla lobes contorted; tube inconspicuous (Corolla divided nearly to the base).

2. **Lysimachia.**

1. PRIMULA Linn.

Primula denticulata Smith.

A perennial scapigerous herb, sparingly mealy, almost glabrous. *Rootstocks* stout, thick. *Leaves* all radical (appearing fully developed after the flowers) 2 by .3-.6 in., (often prolific up to 13 in. long), elliptic-lanceolate, obovate-spathulate, obtuse, minutely toothed or subentire (surrounded at base by leafy scales). *Flowers* capitate. *Corolla* purplish blue; lobes notched. *Capsule* oblong or globose, enclosed by the calyx.

· KHASI & JAINTIA HILLS (up to 6,000 ft.).

Flrs. 3. Fr. Rainy season ?

P. prolifera Wall. is also recorded from Khasi Hills (4-6,000 ft.).

2. LYSIMACHIA Linn.

Lysimachia ramosa Wall.

A perennial weed 2-4 ft., branches winged, quite glabrous. *Leaves* alternate, 1.5-6 by .5-1.3 in., lanceolate-

acuminate, entire, membranous, glabrous, gland-dotted, narrowed into the petiole, .05-.5 in. long. *Flowers* yellow, solitary, axillary; pedicels filiform, 1-2.8 in. long. *Calyx*-segments subglandular. *Corolla* elliptic-oblong. *Capsule* .3 in. across, dehiscing irregularly.

KHASI & JAINTIA HILLS (up to 6,000 ft.).

Flrs. 5-9. Fr. Cold season.

L. evalvis Wall and *L. japonica* Thunb., are also recorded from Khasi Hills.

L. alternifolia Wall is found in the Peak Forest of Khasi and Jaintia Hills (R. N. De)

FAM. 80. MYRSINACEÆ

Trees or shrubs or under-shrubs, sometimes climbing. *Leaves* simple, alternate (sometimes opposite), usually gland dotted, exstipulate. *Flowers* actinomorphic, hermaphrodite or polygamo-dioecious, in cymes, racemes or umbles; bracteoles 2. *Calyx* usually free, 5-fid (4-6), usually inferior (half inferior, free in *Mæsa*) persistent, sometimes slightly accrescent, often gland dotted. *Corolla* gamopetalous, deeply divided or polypetalous; lobes usually 5 (3-7) contorted or imbricate, rarely valvate, often gland dotted. *Stamens* as many as and opposite to the corolla lobes; staminodes sometimes present alternately with the lobes; filaments short, free or more or less connate; anthers introrse, usually dehiscing by longitudinal slits, rarely opening by pores. *Ovary* globose or ovoid, superior or semi-superior (*Mæsa*) 1-celled; style filiform or columnar; stigma simple, rarely shortly lobed; ovules few or many on a free central placenta. *Fruit* usually baccate; seeds usually globose, several hollowed at the base; albumen pitted or ruminant; embryo transverse.

Ovary half inferior. Calyx thickened enclosing the fruit. Fruit many-seeded. 1. **Mæsa.**

Ovary free. Calyx not thickened, free. Fruit 1-seed:—

Filaments O or shorter than anthers:—

Flowers fascicled:—

Corolla lobes imbricate. 2. **Myrsine.**

Flowers racemose or paniculate:—

Corolla lobes usually contorted. .. 3. **Embelia.**

Flowers usually umbellate:—

Anthers free; calyx glabrous. .. 4. **Ardisia.**

Anthers free; calyx hairy. 5. **Sadiria.**

Anthers connate:—

Corolla shortly connate at base; lobes ovate-acuminate. 6. **Hymenandra.**

Corolla-tube somewhat infundibuliform; lobes emarginate. 7. **Amblyanthus.**

Flowers in sessile umbels. Corolla contorted, right hand edge overlapping. .. 8. **Antistrophe.**

Filaments as long as anthers:—

Anthers basifixed; ovary ovoid. .. 9. **Amblyanthopsis.**

1. MÆSA Forsk.

Evergreen shrubs or small trees, sometimes straggling. *Leaves* usually pellucid-punctate, sometimes with resinous lines. *Flowers* 5-merous (rarely 4), often unisexual, diœcious in axillary or terminal often panicled racemes; bracts small. *Calyx* half inferior or nearly free, always semi-adnate to the fruit. *Corolla* rotate or campanulate, rarely urceolate; lobes imbricate, sometimes unequal, rounded with inflexed-tips. *Stamens* inserted in the corolla tube; filaments short; staminodes absent. *Ovary* partially adnate to the calyx; style short; stigma capitate or shortly lobed; ovules many on a globose placenta. *Fruit* small, baccate, globose, crowned with persistent style. *Seeds* many, subtrapezoid.

Corolla almost rotate; lobes as long as or exceeding the tube:—

Leaves toothed, glabrous:—

Calyx segments ciliate. 1. *M. indica.*

Calyx segments not ciliate:—

Inflorescence shorter than the leaf. 2. *M. Chisia.*

Inflorescence longer than the leaf :—

- | | | | |
|--|----|----|-------------------------|
| Stamens not exserted. | .. | 3. | <i>M. paniculata</i> . |
| Stamens exserted. | .. | 4. | <i>M. grandiflora</i> . |
| Leaves entire, glabrous; lateral nerves 6-9; petiole upto .6 in. long. | .. | 5. | <i>M. ramentacea</i> . |
| Leaves crenately serrate, hairy; lateral nerves 8-13; petiole upto 1 in. long. | .. | 6. | <i>M. argentea</i> . |

1. *Mæsa indica* Wall. Vern *Dieng-soh-jala-tyrkai*, Khasi; *Sesu*, Ass. (Sadiya); *Awua-pat*, *Machh-pora*, Ass.; *Sirkhi*, Mech; *Samnakhatok*, Garo; *Dieng-pyllein-dakha*, Synt.; *Kisu-tanop*, *Tasing-Moni*, Miri.

A shrub or a small tree. *Bark* dark-grey; blaze greenish. *Leaves* 2.5-7.5 by 1-3 in., elliptic, elliptic-lanceolate or elliptic-oblong, acute or acuminate, remotely or coarsely toothed, sub-coriaceous, glabrous, pale beneath; lateral nerves 7-15 on either half, rather inconspicuous; petiole .3-1 in. long, channelled. *Flowers* white, scented, in axillary racemes, which are shorter than the leaves, sometimes branched; bracts much acute. *Calyx* minute; tube more or less adnate to the ovary; segments 5, ovate-obtuse, ciliate, more or less veined. *Corolla* about .16 in. across; tube very short; lobes imbricate, round. *Stamens* 5; filaments short; anthers brown, dorsifixed. *Ovary* half inferior; ovules many; style short, persistent in fruit, obscurely lobate. *Berries* small, .15 in. across, pinkish-white, succulent when ripe.

Common throughout the province.

Decoction of the leaves are used for bath in case of fever during convalescence. Ripe fruits are edible.

Flrs. 12-3. Fr. 6-7.

The following separated and classified as distinct species by Mez in Das Pflanzenreich, also occur in the area.

M. montana A. DC., *M. elongata* Mez., *M. coriacea* Mez., *M. maxima* Mez., *M. bengalensis* Mez., *M. manipurensis* Mez.

2. *Mæsa Chisia* Don. Vern. *Ja-siet*, *Dieng-ja-sim*, Khasi; *Thumber*, Kuki; *Gangu-loda*, Kach.; *Susi-porma*, Ass.; *Bilouni*, Nep.; *Dieng-la-thyrma-iong*, Synt.

A gregarious shrub about 15 ft. high. *Bark* brown, warty; blaze greenish; branchlets angled. *Leaves* 3-8 by

1.5-3.5 in., lanceolate, distantly crenate or serrulate, usually long acuminate, membranous, glabrous; lateral nerves slender, 10-12 on either half, arcuate; tertiaries closely anastomosing; base rounded or acute; petiole .6-.8 in. *Racemes* glabrous, lax, often branched, shorter than the leaves. *Calyx* segments not ciliate. *Fruit* white, spongy, juicy, .16-.2 in. across.

N.-E. F. TRACT, SIBSAGAR, N. C. HILLS, CACHAR, SYLHET, K. & J. HILLS, ascending up to 5,000 ft., LUSHAI HILLS.

Young shoots and fruits are eaten.

Flrs. 1-2. Fr. 11.

3. *Mæsa paniculata* (Wall) A. DC.

A small tree; branches slender, whitish, verrucose. *Leaves* variable in size and shape, usually 3-6 by 1-2 in., elliptic or lanceolate (especially those among the flowers), acute or acuminate, sharply serrate or toothed, chartaceous, glabrous, grey underneath; costal nerve impressed above, prominent beneath; petiole .5-1 in. long. *Flowers* whitish, about .1 in. across in lax panicles 4-9 in. long, with very slender branches. *Calyx* not ciliate; segments elliptic, rotundate. *Corolla* lobes ovate, rotundate, crenulate. *Anthers* campanulate. *Stigma* obtuse. *Fruit* globose, .12-.15 in. across. *Seeds* minute.

No specimen in Forest herbarium (Shillong).

SYLHET (Hk. f. and T), KHASI HILLS (Brandis), LUSHAI HILLS.

4. *Mæsa grandiflora* Mez.

Branches thick, adpressedly ferruginous, lepidote. *Leaves* 8.7 by 3.2 in., elongate-elliptic, acuminate, toothed, membranous, hardly rugose, hairy on the nerves; base shortly acute or rotundate; petiole .8 in. long. *Inflorescence* paniced; pedicels .1-.12 in. long. *Flowers* .17 in. long, and .33 in. across, regular, 5-7-merous. *Calyx-segements* ovate, rotundate, more or less acute, margin toothed. *Corolla* .3 in., connate; lobes lineate. *Stamens* exserted; anthers emarginate on both sides, almost dorsifixed. *Ovary* superior; stigma minutely lobed; style short.

ASSAM (Simmons).

(Das Pflanzenreich, Myrsinaceae, Mez., p. 44).

5. *Mæsa ramentacea* A. DC. Vern. *Dieng-soh-eit-iar*, Khasi; *Seketia*, Ass.; *Lajachio*, Naga; *Bol-jakhandok*, Thebeloa, Garo; *Theng-merok-kelok-arong*, Mik.; *Arong*, Kuki.

A large shrub or a small tree (up to 30'/25"). *Bark* dark-brownish, warty, .3 in. thick having vertical lenticels; blaze greenish-white, turning brownish; wood with a fragrant small light cream turning darkish; branches hanging verrucose. *Leaves* 3-8 by 1-2.3 in., ovate-lanceolate to elliptic-lanceolate, entire, slightly recurved, acuminate, rarely acute, thinly coriaceous, glabrous with long transparent bars; lateral nerves more prominent below, 6-9 on either half, distant; base rounded or acute; petiole up to .6 in. long. *Flowers* white, small in axillary glabrous compound racemes, usually not exceeding the leaves, sometimes longer or shorter. *Fruit* succulent, dull brownish-white, .12 in. across. *Seeds* angular, rugose, dark-brown or blackish.

LAKHIMPUR, SIBSAGAR, N. C. HILLS, CACHAR, SYLHET, GARO HILLS, K. & J. HILLS, ascending up to 2,000 ft.

Flrs. 1-4. Fr. 10-11.

6. *Mæsa argentea* Wall.

A large shrub; bark-brownish, twigs hollow; stems shining; branchlets pubescent. *Leaves* 4.5-9 by 2-4 in., elliptic or elliptic-oblong, acute or acuminate, serrate, rather membranous, green above, pale whitish beneath, more or less pubescent on both surfaces especially along the midrib and the nerves; lateral nerves 8-13 on either half, reticulated nerves obscure; base cuneate; petiole up to about 1 in. long, pubescent. *Flowers* in simple or branched short pilose or hairy racemes about half the length of the petiole; bracteoles 2. *Calyx-segments* glabrous, rather acute, somewhat crenulate towards the apex. *Corolla* lobes reniform, minutely crenulate, lanceolate. *Ovary* inferior; stigma obscurely lobed. *Fruit* nearly white, comparatively large.

K. & J. HILLS, ascending up to 6,000 ft.

Flrs. 4-5. Fr. 9.

2. MYRSINE Linn.

Trees or shrubs, usually glabrous. *Leaves* coriaceous. *Flowers* 4-5-merous, small, polygamous or diœcious, subsessile or shortly pedicellate, in sessile or shortly pedunculate axillary fascicles; bracts deciduous, densely imbricate. *Calyx* small, persistent. *Corolla* white; lobes connate or free, imbricate or valvate, resin-dotted. *Stamens* united at the base of the corolla. *Ovary* free, globose or ovoid; ovules few or many, immersed in the placenta; style short or almost obsolete; stigma 2-5 or spreading, sometimes sessile. *Fruit* small, globose, dry or fleshy, red or purple, 1-seeded; albumen pitted, scanty, ruminant.

A. Style branches spreading :—

A small evergreen shrub. Leaves up to 1 in. long, sharply toothed:—

Anthers longer than broad. 1. *M. africana*.

A large shrub or small tree. Leaves 2-6 in. long, usually sharply serrate:—

Anthers scarcely longer than broad. 2. *M. semiserrata*.

B. Style branches not spreading :—

A small tree. Leaves 2-7 in. long, entire; petiole marginate. 3. *M. capitellata*.

(Mez has put *M. capitellata* under genus *Rapanea* Aubl.).

1. Myrsine africana Linn.

A small angular shrub; branchlets and petioles rusty-pubescent. *Leaves* .5-1.5 by .3-.5 in., lanceolate or obovate, minutely cuspidate-serrate, midrib prominent; petiole minute. *Flowers* small, diœcious, sub-sessile, tetramerous in axillary cluster of 4-6. *Anthers* exceeding the corolla. *Style* short; stigma large, flat. *Fruit* .15 in. across, usually red, smooth.

KHASI HILLS (U. Kanjilal).

(There is no record in Forest herbarium).

2. Myrsine semiserrata Wall.

A shrub or a small tree. *Bark* ashy grey outside, reddish-brown inside with somewhat regular narrow streaks of lighter tissue. *Leaves* 2-5 by .6-1.3 in., lanceolate-serrate

or sparingly cuspidate-serrate towards the apex, coriaceous, glabrous; lateral nerves slender, 11-13 on either half; base cuneate; petiole .1-.3 in. long. *Flowers* pinkish, usually 4-merous, .1 in. across, in dense axillary fascicles or below leaves; pedicels .2-.8 in. long, glabrous. *Calyx* persistent. *Anthers* large, sessile. *Style* short. *Fruit* .2-.3 in. across, globose, filled with watery juice, bluish or pinkish purple when ripe on filiform pedicels.

K. & J. HILLS, ascending upto 6,000 ft., LUSHAI HILLS.

Flrs. 9-12, sometimes later. Fr. 1-6.

3. *Myrsine capitellata* Wall. Vern. *Dieng-ching*, Khasi; *Kachidria*, Ass.; *Dieng-shi-ing*, Synt.

A shrub or a small tree, sometimes growing up to 50'/32". *Bark* warty, .25 in. thick, exfoliating in small flakes; inside reddish-brown with fairly regular, wedge-shaped, whitish streaks on an oblique section. *Leaves* 3-7 by .6-2.5 in., lanceolate or elliptic-lanceolate, entire, margins recurved, subacute or acute, chartaceous with red dots along the margins, pellucid-punctate elsewhere; lateral nerves slender, 10-16 on either half, midrib fleshy, depressed above; marginate petiole up to .5 in. long. *Male flowers* globose in bud, whitish with reddish dots and veins in shortly peduncled, fascicle in axils of current years leaves or below the leaves. *Bisexual flowers* fascicled on the stem on slender pedicels, .25-.4 in. long. *Calyx*-segments ciliate. *Corolla* lobes ultimately recurved; anthers large, reddish, turning purple, sessile on bisexual flowers and on short filaments in male flowers; stigma large, laciniate, reflexed on a short but conspicuous style with a conical base. *Fruit* about .16 in. across, broader than long, bright purple when ripe.

LAKHIMPUR, K. & J. HILLS.

Wood with a faint garlic smell, reddish-brown, hard, very elastic, medullary rays close and fine but prominent.

Flrs. 12-1. Fr. 9.

Var. *lanceolata* Wall. Apparently evergreen. *Leaves* smaller (2-4.3 by .6-1.2 in.) more coriaceous, ascending, crowded at ends of

branchlets; old leaves yellow. *Flowers* fascicled, mostly below the leaves. *Corolla* valvate, red outside, puberulous along margin.

K. & J. HILLS.

Flrs. 12.

3. EMBELIA Burm.

Shrubs or small trees as a rule evergreen, usually most species climbing. *Leaves* alternate, entire or toothed, usually glandular; petiole often margined or glandular. *Flowers* small, whitish or pinkish, hermaphrodite or polygamodiceous, in axillary or terminal, simple or compound racemes or panicles; bracts small; bracteoles absent. *Calyx* free, persistent, floral parts usually gland dotted, 4-5 fid or partite. *Corolla* lobes 4-5, slightly coherent at the base, usually imbricate in bud. *Stamens* 4-5; filaments more or less adnate to the petals; anthers ovate-oblong. *Ovary* ovoid or globose; ovules few on a sub-globose placenta; style short; stigma capitellate. *Fruit* small, globose, usually 1-seeded (rarely-2) berry. *Seed* globose, base excavated; testa membranous; albumen pitted or sub-ruminate; embryo transverse, curved.

Petals imbricate in bud, 5-merous :—

Inflorescence terminal, paniculate :—

Back of anther masses verrucose.

Flowers pedicellate. 1. *E. Ribes.*

Back of anther masses not verrucose.

Flowers sessile. 2. *E. sessiliflora.*

Inflorescence not terminal, racemose;

petiole .25-5 in. long. 3. *E. robusta.*

Inflorescence sub-umbellate. Flowers 5-merous :—

Inflorescence 7-fld. Ovary pilose. .. 4. *E. pulchella.*

Inflorescence 5-fld. Ovary glabrous. 5. *E. parviflora.*

Petals twisted in bud. Flowers 5-merous :—

Inflorescence amply paniculate. .. 6. *E. floribunda.*

Inflorescence simple, racemose :—

Leaves sub-entire, rarely denticulate; racemes .5-1 in. long. 7. *E. nutans.*

Leaves conspicuously serrate; racemes 1-2 in. long. 8. *E. vestita.*

Petals imbricate in bud. Flowers 4-merous :—

Leaves membranous. 9. *E. Nagushia.*

1. Embelia Ribes *Burm.* Vern. *Bakul lata*, Ass.; *Mei-ka-e-jaodain*, Synt.

A scandent or scrambling shrub; stem warty, spinescent (arrested branchlets); bark grey. *Leaves* 1·5-4 by ·7-2 in., glabrous with scattered reddish glands; lateral nerves many, very slender, not quite prominent; midrib very prominent beneath; reticulation of nerves marked; base cuneate or rounded; petiole ·2·5 in. long, glandular margined. *Flowers* usually 5-merous, greenish yellow, small, numerous, in pubescent terminal or axillary lax, panicles; branches 3-4 in., glandular, pubescent; pedicels ·3 in. long; bracts very small, deciduous. *Calyx* ovate, ciliate. *Corolla* lobes imbricate in bud, elliptic, pubescent. *Fruit* black, succulent, ·1·16 in. in diameter.

SIBSAGAR, LAKHIMPUR, K. & J. HILLS.

Flrs. 2.

2. Embelia sessiliflora *Kurz.* Vern. *Soh-jeu-tenk-sai*, Khasi.

A large climber; stem covered with reticulately split grey cork, very similar to *E. Ribes*. *Leaves* small, ovate; base rounded or shallowly sub-cordate; petiole margined but not usually glandular. *Flowers* sessile, whitish; panicles grey pubescent, usually smaller. *Fruit* ·25 in. across, depressed, globose, edible.

K. & J. HILLS.

Flrs. & Fr. -9.

3. Embelia robusta *Roxb.*

A large scrambling shrub or small tree. *Bark* brown with horizontal cracks and numerous lenticels on the branches. *Leaves* 2-5 by 1-2·5 in., ovate-oblong, elliptic or oblanceolate, acuminate, undulate or serrulate, thinly coriaceous, more or less puberulous beneath, especially along the nerves; lateral nerves 6-12 on either half, prominent beneath, arcuate; base cuneate; petiole ·2·7 in. long, channelled. *Flowers* small, mostly dioecious in axillary or extra axillary, more or less pubescent, simple or fascicled

racemes. *Calyx* persistent. *Corolla* lobes reflexed, puberulous. *Anthers* rotundate. *Fruit* globose, red, more or less longitudinally striated, crowned with the remains of the style. *Seeds* usually solitary, globose with a hollow base.

LAKHIMPUR, K. & J. HILLS, ascending up to 5,000 ft.

Flrs. 5-6. Fr. Cold season.

Var. ferruginea Wall. Shrub 5-6 feet; branches, inflorescence and leaves beneath rusty tomentose. *Leaves* smaller 1·5-3·3 by 1·2 in. *Male flowers* in axillary undivided racemes, greenish-white, each subtended by a setaceous hairy bract. *Calyx* salver-shaped; calyx and corolla with brown dots. *Corolla* lobes slightly connate at the base, tomentose.

4. *Embelia pulchella* Mez.

Branches slender. *Leaves* ·8 by ·5 in., ovate, rounded or gradually narrowed, almost entire, glabrous, somewhat minutely punctate beneath. *Inflorescence* many fld. sub-umbellate, rusty glandulose. *Male flowers*: calyx-segments narrowly lanceolate or sublinear, acute; petals narrowed. *Stamens* small; anthers punctate. *Female flowers*: calyx segments rounded, punctate, pilose on the back; petals broadly elliptic, villous. *Ovary* reduced, rusty villous, somewhat ovoid; style glabrous; stigma somewhat capitate, scarcely small.

ASSAM, (Griffith No. 3545). MANIPUR (Watt. No. 7277).
(After Mez. Pflanzenreich, Myrsinaceæ, p. 324).

5. *Embelia parviflora* Wall. Vern. *Tille-la-maksiar*, Synt.

A scandent shrub or slender climber. *Bark* brown; branchlets pubescent, branchlets and leaves bifarious. *Leaves* ·5-1 by ·25-·5 in., ovate or elliptic, entire, acute or obtuse, chartaceous, rusty pubescent, underneath black dotted; lateral nerves obscure, 8-10 on either half; base rounded; petiole ·08 in. long, rusty tomentose, channelled. *Flowers* in short axillary rusty pubescent, umbellate raceme. *Calyx* segments fimbriate, ciliate. *Corolla* lobes oblong-rounded, ciliate, glandular. *Stigma* peltate. *Fruit* globose, ·16-·2 in.

across, greenish-white, red in ripening, black when dry, tipped with the remains of the style. (*Fruiting pedicels* filiform, about as long as diameter of fruit, nodding).

K. & J. HILLS, NAGA HILLS, CACHAR.

Flrs. 1. Fr. Hot season.

6. *Embelia floribunda* Wall. Vern. *Ja-buit*, *Jermi-jajew*, Khasi; *Naibandon*, Tipp.; *Jajao-raiso*, Synt.

A large climber; branches lenticellate. *Leaves* 1·5-6·5 by ·7-1·5 in., lanceolate, entire, long acuminate, sub-coriaceous, glabrous with a line of reddish glandular dots along the margins; lateral nerves very fine, about 30 on either half, just visible on the upper surface, obscure beneath; base more or less rounded; petiole ·2-·6 in. long, glandular. *Flowers* usually 5-merous, small, dull or greenish-white, in axillary puberulous paniced raceme; pedicels ·07 in. long. *Corolla* lobes slightly overlapping to the right, oblong or ovate, pubescent within, recurved in open flowers. *Fruit* greenish to pinkish-black when fully ripe with a sweetish juice, ·15 in. across.

SIBSAGAR, DARRANG, K. & J. HILLS, ascending up to 5,000 ft.

Flrs. 11-1. Fr. 6-10.

7. *Embelia nutans* Wall. Vern. *Bon-mirica*, *Chaurasi-lewa*, Ass.; *Thibihi*, Mik.

A fairly large woody climber; young shoots rusty, pilose; stem lenticellate. *Leaves* ·8-3·5 by ·5-1·5 in., oblong-ovate or oblong-entire, sometimes obscurely crenulate towards the apex, bluntly acuminate, membranous, gland dotted, paler beneath; midrib sparingly rusty, puberulous; lateral nerves very slender, many, almost sub-parallel; base rounded or acute; petiole ·2-·5 in. long, rusty pubescent, shallowly channelled. *Flowers* small, 5-merous, in axillary rusty pubescent, simple racemes, about ·7 in. long; pedicels about ·1 in. long. *Calyx* segments glabrous, triangular, acute. *Corolla* rotate; lobes oblong with glandular hairs,

twisted in bud with unpleasant smell. *Ovary* beaked. *Fruit* globose, .2 in. across.

LAKHIMPUR, SIBSAGAR, KAMRUP, GOALPARA, SYLHET, KHASI & JAINTIA HILLS, ascending up to 5,000 ft.

Leaves are used for fermenting country liquor.

Flrs. 2. Fr. 5.

8. *Embelia vestita* Roxb. Vern. *Mei-jajeo*, Khasi.

A scandent fairly woody shrub. *Bark* whitish-grey, warty, often with numerous lenticels; blaze yellowish. *Leaves* 1.5-3 by .5-1.2 in., oblong-lanceolate or elliptic-lanceolate, closely serrulate, bluntly acuminate, gland-dotted, glossy, green above, glabrous; lateral nerves many, very slender; base rounded or acute; petiole .25-.3 in. long. *Flowers* small, in rusty pubescent, simple racemes, up to 2.2 in. long, axillary or arising from old wood; pedicels .15 in. long. *Calyx* segments triangular, obtuse, punctate. *Corolla* lobes oblong, punctate, twisted in bud. *Ovary* beaked, punctate. *Fruit* globose, .15 in. across.

NOWGONG, K. & J. HILLS, ascending up to 5,800 ft.

Flrs. 12-1. Fr. 3-5.

9. *Embelia Nagushia* Don. *Prodr.* *E. undulata* Mez. Vern. *Dieng-sai*, *Mei-jajeu-khlaw*, Khasi; *Bon-pui*, Ass.

An extensive evergreen woody climber. *Bark* dark-grey, rough, .12 in. thick with vertical cracks on old stem; blaze first layer green and inside brown with vertical lines. *Leaves* 1.5-5 by .8-2 in., acid, elliptic or obovate-lanceolate, entire, acuminate, acute or obtuse, rather membranous, dark-green, glabrous; lateral nerves many, very slender, sub-parallel, arcuate; base acute or cuneate; petiole .2-.6 in. long. *Flowers* 4-merous, often hermaphrodite, in axillary simple racemes up to 1.25 in. long, usually from old leafless branches; pedicels usually .1 in. long. *Calyx* segments triangular, acute, .1 in. long. *Corolla* lobes oblong, obtuse, .15 in. long. *Fruit* .25-.3 in. across, globose, depressed, red when ripe; albumen ruminant with longitudinal streaks.

DARRANG, KAMRUP, K. & J. HILLS, ascending up to 5,000 ft.

Leaves are eaten cooked with fish.

Flrs. 3-6. Fr. 9-12.

E. Subcoriacea (Clarke) Mez Nov. Sp. Vern. *Poimuri-tenga*, Ass.; *Trimong-ribute*, Mik.; *Jermai-masi*, Synt.

An extensive climber. *Leaves* 2.5-5 by .8-2.5 in., usually acute or sub-obtuse with translucent bars and dots; base cuneate; petiole up to .7 in. long. *Flowers* in racemes about 3 in. long, arising from old wood. *Fruit* red, similar to *E. Nagushia*.

N.-E. F. LAKHIMPUR, SIBSAGAR, K. & J. HILLS, up to 6,000 ft.

Leaves eaten by Khasis.

Flrs. 5-6. Fr. Cold season.

(This variety of Clarke is described as a distinct species *E. subcoriacea* (Clarke) Mez, by Mez in *Pflanzenreich*, Myrsinaceae, p. 329).

E. Clarkei Bedd et Mez.

Branches slender. *Leaves* ovate, finely acuminate, chartaceous; petiole .2 in. long. *Inflorescence* sub-umbellate, 7-12 flowered. *Calyx* segments shortly connate at the base, elliptic, rotundate, ciliate, somewhat punctate. *Corolla* lobes elliptic; male flower acute. *Anthers* mucronate; female flower rotundate, densely papillose inside, somewhat punctate. *Ovary* ovoid; style cylindric; stigma disciform.

E. myrtifolia Hemsl et Mez.

Branches slender, densely ferruginous-tomentose. *Leaves* .6 by .3 in., rotundate, entire, chartaceous; petiole .02 in. long. *Inflorescence* sub-umbellate, 3-5-flowered. *Calyx* segments somewhat connate, ovate-ligulate, rotundate. *Corolla* lobes of male flowers oblong, of female flowers elliptic, narrowly rotundate or somewhat acute, punctulate towards the apex. *Filaments* manifest. *Ovary*-female flowers: sub-globose; style long; stigma disciform. *Albumen* minute.

4. ARDISIA Swartz.

Shrubs or small trees. *Leaves* usually gland dotted. *Flowers* actinomorphic, hermaphrodite, in axillary or terminal, simple or compound umbels or racemes; bracts small, usually deciduous. *Calyx* segments 5 (rarely 4), persistent, somewhat accrescent in fruit. *Corolla* lobes 5 (rarely 4-6), usually acute, twisted to the right in bud. *Stamens* as many as and opposite to the corolla lobes; filaments short; anthers free, ovate-lanceolate or sagittate,

acute, usually dehiscent longitudinally and introrsely. *Ovary* globose or ovoid, narrowed to the apex; style cylindric; stigma punctiform; ovules few, immersed in a globose placenta. *Fruit* sub-globose or globose, usually pointed with the persistent style. *Seed* solitary, globose; albumen pitted or ruminate; embryo transverse.

Inflorescence lateral. Sepals broad, overlapping with the right hand edge. Style shorter than the petals in bud :—

Leaves entire :—

Leaves glabrous :—

Flowers in corymbs. Leaf blade 3-8 in., obovate or oblong-elliptic, fleshy, coriaceous. 1. *A. humilis*.

Flowers in bracteate racemes. Leaf blade 5-5-10 in., membranous. 2. *A. polycephala*.

Flowers in lax few-flowered racemes :—

Leaf blade 1-5-5-5 in., thinly coriaceous. 3. *A. oxyphylla*.

Leaf blade 3-4-5 in., elliptic-lanceolate, entire or obscurely serrate. 4. *A. rhynchophylla*.

Flowers in pedunculate umbels. Leaf blade 2-5 in., linear-lanceolate or oblanceolate. 5. *A. khasiana*.

Flowers in involucrate umbels. Leaf blade about 5 in long, ovate-oblong. 6. *A. involucrata*.

Leaves hairy beneath :—

Blade about 8 in. Branches rusty villous. 7. *A. grandifolia*.

Inflorescence terminal or axillary. Sepals narrow, open in bud. Style longer than the petals in bud. Leaves entire (except *A. Icara*) :—

Sepals and petals not punctate. Leaves serrulate. 8. *A. Icara*.

Flowers in large terminal panicles. 9. *A. floribunda*.

Flowers in compound umbels. 10. *A. depressa*.

Sepals and petals distinctly punctate :—

Flowers in pedunculate compound corymbs; pedicel 4 in. long. 11. *A. pedunculosa*.

Flowers in large terminal panicles :—

Fruit obtusely 5-angular. 12. *A. quinquangularis*

Fruit vertically striated. 13. *A. Griffithii*.

Flowers small in large sub-pyramidal compound panicles; pedicels .1 in. long; branches ferruginous, lepidote:—

Fruit smooth. .. 14. *A. colorata*.

Inflorescence terminal, paniced, supported by false whorl of leaves:—

Leaves entire:—

Sepals and petals not punctate.

Flowers in terminal pyramidal panicles. .. 15. *A. paniculata*.

Leaves crenate or serrate:—

Branchlets and petioles glabrous:—

Ovary ovoid:—

Berries bright red or purplish, .3-.6 in. across. Leaves with a row of raised dots on the margin. Petals .25-.3 in. 16. *A. macrocarpa*.

Berries about half the above. Leaves without a row of raised dots on the margin. Petals smaller than the above. 17. *A. crispa*.

Ovary ellipsoid. Berries yellow, spotted, .25-.3 in. across. Leaves 4-7 in. long. .. 18. *A. virens*.

Branchlets and petioles hairy. Leaves 3.5-6.5 in. long, membranous. Berries scarlet, .25 in. across. .. 19. *A. odontophylla*.

1. *Ardisia humilis* Vahl. (including var. *arborescens* Wall). Vern. *Thantup*, Manip.; *Detao*, Mik.; *Aria*, E. Bengal; *Chauldhoa*, Ass.; *Thai-gidhih-phang*, Khasi; *Praudettod-arong*, Mik.

A large glabrous shrub. *Leaves* 3-8 by .7-3.5 in., obovate-oblong or elliptic, acute or shortly acuminate, entire, fleshy, coriaceous, glabrous; lateral nerves rather obscure; base narrowed into a marginate petiole up to .5 in. long. *Flowers* pinkish, about .5 in. across, in pedunculate mostly axillary corymbose racemes; pedicels 1-2 in. long; bracts deciduous. *Calyx* segments obtuse, oval or rounded, more or less ciliate, black dotted, slightly accrescent in fruit. *Corolla* lobes acute, black-dotted, twisted to the right in bud. *Filaments* short; anthers acute. *Fruit* sub-globose, size of a pea, .3 in. across, blackish when ripe, slightly depressed, scarcely striate.

N. LAKHIMPUR, SIBSAGAR, CACHAR, KAMRUP, NOWGONG, GOALPARA, N. C. HILLS, K. & J. HILLS, ascending up to 4,000 ft.

Bark (in paste) is said to be efficacious in snake bite and is applied on the part stricken.

Flrs. 6-7. Fr. Cold season.

2. *Ardisia polycephala* Wall. Vern. *Dieng-soh-si-ing*, Khasi; *Thaidi-bu*, Kach.; *Toidong-thing*, Kuki.

A small tree. *Bark* brownish-grey with close horizontal wrinkles and warts; inside reddish-brown; inner half with straight fibres, outer granular with horizontal canal, exuding a reddish gum. *Leaves* 5·5-10 by 2·2-3 in., oblong-lanceolate or elliptic-lanceolate, acute, entire, membranous, glabrous; lateral nerves numerous (about 30 on either half), slender, distinct; base narrowed into a petiole up to 1 in. long. *Flowers* ·6 in. in diameter, waxy, light pink in bracteate corymbose racemes; peduncles 3-4 in. long; pedicels ·5-1 in. long. *Calyx* segments sparsely ciliate, ovate, obtuse, very small. *Corolla* lobes fleshy, shining, waxy, recurved in open flowers. *Berry* globose, obscurely striate.

N. C. HILLS, MANIPUR, K. & J. HILLS.

Fruits and young plants are eaten. Medullary rays very fine close and straight.

Flrs. 4. Fr. 12-6.

3. *Ardisia oxyphylla* Wall.

An under-shrub; stem grey. *Leaves* 1·5-5·5 by ·4-2 in., oblanceolate or elliptic-lanceolate, almost entire, acute or acuminate, thinly coriaceous, glabrous; lateral nerves very slender, distinct; base cuneate or acute; petiole up to ·3 in. long. *Flowers* in axillary few flowered racemes. *Calyx* segments rounded, crenately ciliate. *Corolla* lobes assymmetrically ovate, oblique, sub-acuminate, punctate. *Stamens* somewhat shorter than the corolla lobes. *Ovary* sub-ovoid. *Fruit* depressed, globose, red when ripe, obscurely striate on pedicels ·5-·6 in. long.

K. & J. HILLS, ascending up to 6,000 ft.

Flrs. & Fr. Cold season.

4. *Ardisia rhynchophylla* Clarke.

A small branched shrub. *Leaves* 3-4·5 by 1-1·25 in., elliptic-lanceolate or obovate-lanceolate, entire or obscurely serrate, acuminate, thinly coriaceous, glabrous; lateral nerves impressed above, prominent beneath, about 11 on either half, arcuate; base cuneate; petiole up to ·35 in. long. *Flowers* small in shortly pedunculate few flowered lax racemes; pedicels about 1 in. long. *Calyx* segments concave, elliptic. *Calyx* lobes ovate, acuminate, densely punctate. *Ovary* ovoid. *Fruit* globose, ·2 in. across.

K. & J. HILLS, 5,000 ft. (Mann's No. 910).

Flrs. 5. Fr. Cold season.

5. *Ardisia khasiana* Clarke.

Under shrub 3 ft. high in shade; young branchlets hairy. *Leaves* 2-5 by ·3-1 in., more or less crowded towards the summit of branchlets, linear-lanceolate or oblanceolate, entire, acuminate, glabrous, gland dotted; lateral nerves numerous, prominent beneath, very slender, oblique, arcuate; base narrowed into petiole up to ·3 in. long. *Flowers* in few flowered axillary pedunculate glabrous umbels; peduncles 1 in. long, pedicels about 1 in. long. *Calyx*-segments broadly elliptic, more or less orbicular in fruit. *Corolla* lobes assymetric, acuminate, narrowly rotundate, black dotted. *Filaments* somewhat shorter than the corolla lobes. *Ovary* ellipsoid. *Fruit* purplish-black when ripe, fleshy, ·25 in. across, depressed, scarcely striate.

CACHAR, LUSHAI HILLS, MANIPUR, KHASI HILLS, ascending up to 6,000 ft.

Flrs. 6-9. Fr. 11-2.

Var. Thomsoni Clarke. *Leaves* obovate-lanceolate, 5 by 1·75 in. *Anther back* not punctate; style base granulate.

KHASI HILLS, (3-4,000 ft.).

It is separated as a distinct species. **A. Thomsoni** (Clarke) Mez., Mez in Pflanzenreich Myrsinaceæ.

6. *Ardisia involucrata* Kurz.

A shrub; branches rather glabrous. *Leaves* about 3·5-8 by 1·5-3 in., oblong or ovate, bluntly acuminate, scarcely

acute, rather opaque; lateral nerves 12-20 on either half, slender, parallel; gland-dots conspicuous; base deccurent; petiole .2-.4 in. long. *Flowers* in lateral involucrate umbels; peduncles stout, 1-3 in. long; pedicels 2-5; bracts many, persistent. *Calyx*-segments large, waxy, pinkish. *Corolla* lobes .3-.5 in. long, black dotted. *Filments* short. *Ovary* large, glabrous, globose. *Berry* about .25 in. across, scarcely striate (Calyx enlarged in fruit connivent over the berries-Brandis).

GOALPARA.

Flrs. Rainy season. Fr. Cold season.

7. *Ardisia grandifolia* A. DC.

Branches densely villous. *Leaves* 12 by 4 in., ovate-oblong or oblong-elliptic, shortly acuminate, chartaceous, glabrous above, rusty puberulous at least on the nerves beneath; lateral nerves, slender, conspicuous; base gradually narrowed into the petiole .2-1 in. long. *Inflorescence* lateral; peduncles pilose bearing umbels. *Calyx* segments somewhat elliptic, more or less acute, ciliate, scarcely punctate. *Berries* globose, about .25 in. across.

CACHAR, MANIPUR (Brandis).

8. *Ardisia Icara* Ham. Vern. *Paysa-changne*, Duff.

A large shrub sometimes gregarious in beds of nalas; main stem often with raised black warts. *Stem* greenish-grey, shining. *Leaves* 2.5-7.5 by .7-2 in., usually elliptic-lanceolate, shortly acuminate or acute, distinctly crenulate, more or less entire towards the base, thinly coriaceous, glabrous but sparingly punctate; lateral nerves numerous, very slender, more or less parallel, getting rather obscure towards the margin; base cuneate; petiole .2-.5 in. long. *Flowers* small in densely crowded ample racemed rusty panicles; bracts foliaceous, with rusty scales beneath; bracteoles linear, smaller. *Calyx* segments rusty puberulous, linear-lanceolate, acute. *Corolla* lobes assymetric, ovate, narrowly rotundate. *Style* not longer than the corolla. *Fruit* obscurely pentagonal.

N.-E. F., LAKHIMPUR, SIBSAGAR, DARRANG, KAMRUP, GOALPARA.

Flrs. 4. Fr. Cold season.

9. *Ardisia floribunda* Wall. Vern. *Theilang-rong*, Tipp.; *Bhaujawa*, Synt.; *Thengpi-chorleng*, Mik.

A large shrub or a small tree. *Bark* greyish-white, thin with minute vertical lenticels; *blaze* greenish-brown; *wood* white. *Leaves* 5-10 by 1·3-3 in., narrow-lanceolate or elliptic or oblong-lanceolate, entire, acute, membranous, glabrous, gland dotted; lateral nerves transverse, slender, parallel, arcuate, prominent beneath; base attenuate; petiole stout, up to ·5 in. long. *Flowers* reddish in large minutely rusty, lepidote panicles; peduncles 3-4 in. long; pedicels umbelled, ·25 in. long. *Calyx* segments ovate, minutely red-dotted. *Corolla* lobes assymetric-ovate. *Anthers* minute; style filiform, ·3 in. long. *Fruit* depressed, red-dotted, 5-angled.

SIBSAGAR, CACHAR, SYLHET, GOALPARA, K. & J. HILLS, ascending up to 4,000 ft.

Ripe fruits are eaten.

Flrs. 6-11. Fr. Cold season. Often flrs. and frs. throughout the year.

10. *Ardisia depressa* Clarke. Vern. *Pashalaranga*, Ass.; *Ponglubasi-change*, Duff.

A shrub 10 ft. high; bark greyish-white, warty, green below the cuticle, ·12 in. thick; blaze-reddish; wood cream coloured. *Leaves* 1·5-7 by ·7-2 in., elliptic-lanceolate or nearly oblong-lanceolate, entire, acuminate, thinly coriaceous, glabrous; lateral nerves numerous, sub-parallel, very slender with an obscure intramarginal nerve; base acute; petiole ·2-·6 in. long, rusty tomentose. *Flowers* small, pinkish in long pedunculate much branched, cymose umbels axillary, lateral or on small branchlets. *Calyx* segments spreading, ovate-lanceolate, acute, pubescent. *Corolla* lobes spreading, glandular. *Fruit* depressed, globose, ·25 in. across.

LAKHIMPUR, SIBSAGAR, DARRANG, GOALPARA, KHASI

11. *Ardisia pedunculosa* Wall.

A shrub up to 10 ft. high, with spreading branches; stem grey. *Leaves* 2-8·5 by ·6-2 in., narrow lanceolate to oblong-lanceolate, margins recurved, entire or very minutely serrulate, rather membranous; lateral nerves obscure, midrib depressed above, prominent beneath with a line of red dots along the margins and translucent bars all over; base cuneate; petiole ·1-·6 in. long. *Flowers* rosy pink about ·5 in. across, in axillary pedunculate racemed umbels or compound corymbs or at the ends of branchlets. *Inflorescence* often drooping; pedicels ·6-1 in. long, reddish, slender; peduncles 2-3 in. long, slender, quite glabrous; buds acute. *Calyx* segments ·12 in. long, spreading punctate, ovate-lanceolate, acute. *Corolla* lobes shortly connate, overlapping, twisted to the right in bud, ovate, sharply pointed, fleshy at base. *Style* as long as corolla lobes. *Ovary* glabrous, ovoid. *Fruit* depressed, globose, black, ·25 in. across. *Seeds* striate.

KHASI HILLS, up to 5,000 ft.

Flrs. 11. Fr. Cold season.

12. *Ardisia quinquangularis* A. DC.

Branches rather slender. *Leaves* about 7 by 1·5 in., broadly lanceolate, acute, entire, sub-membranous, opaque punctulate; base gradually acute; petiole ·6 in. long. *Flowers* in large terminal panicles. *Calyx* segments 5, pubescent, ovate, rather acute, margins ciliate. *Corolla* lobes ·5 in. long. *Drupe* depressed, obtusely 5-angular, about ·2 in. across.

ASSAM (Clarke). KHASI HILLS, up to 4,000 ft. Mann's sheet No. 540.

Flrs. 5-6.

13. *Ardisia Griffithii* C. B. Clarke. Vern. *Dieng-soh-pi-kenneng*, Khasi; *Dieng-pylleng-dakha*, Synt.

A shrub up to 8 ft. high with simple grey stem; branches rather stout, spreading. *Leaves* 6-12 by 1·3-4 in., oblanceolate, ovate-oblong, entire, coriaceous, glabrous, acute, shining above, cinnamon colour beneath; lateral nerves

numerous, sub-parallel, very slender, transverse; petiole semi-circular in scales up to .5 in. long. *Flowers* in large dense terminal panicles; bracts more or less persistent, elliptic-oblong, .13 in. long; pedicels rusty pubescent, umbelled. *Calyx* pubescent; segments slightly connate at the base, oblong or rotundate, ciliate in the margin. *Fruit* black when fully ripe with pink juice, globose, vertically striated about .25 in. across.

KHASI HILLS, 4,500 ft.

The flowers are said to be eaten, cooked and taste like fish.

Flrs. 4-6. Fr. Cold season.

14. *Ardisia colorata* Roxb. Vern. *Rulthlu*, Lushai; *Bol-simbal*, Garo; *Naltong*, Kuki.

A shrub or a small tree up to 25 ft. high; bark-grey, warty with minute vertical lenticels, green below the cuticle, .25 in. thick; blaze light cream. *Leaves* 3.5-11 by .8-3 in., oblong-lanceolate, entire, acute or bluntly acuminate, coriaceous, glabrous; lateral nerves about 20 on either half, almost at right angles to the midrib, sub-parallel, arcuate; midrib and nerves impressed above, prominent beneath; petiole channelled, .3-.5 in. long; base of petiole decurrent on the stem. *Flowers* small, reddish white, in large terminal panicles; peduncles and branches flattened; pedicels umbelled. *Calyx* segments elliptic-oblong, punctate. *Corolla* lobes about .1 in. long. *Style* much larger than the corolla lobes. *Fruit* bright pink, globose, .2 in. across.

CACHAR, SIBSAGAR, LAKHIMPUR, KHASI HILLS, GARO HILLS.

Wood reddish, mottled with brown streaks.

Flrs. 12-1. Fr. 4-5.

15. *Ardisia paniculata* Roxb. Vern. *Soh-Dannai-khyntew*, *Dieng-soh-botut*, Khasi; *Hanpharo*, Mik.

A large shrub; stem simple, fleshy. *Leaves* 6-14 by 2.5 in. (largest 18 by 4 in.), alternate on main stem, whorled or crowded at the ends of branchlets, oblanceolate, entire, acuminate, coriaceous, glabrous, shining above, pale and

punctulate beneath; lateral nerves 12-15 on either half, arcuate, impressed above, prominent beneath; midrib keeled; base decurrent into a short thick petiole. *Flowers* rosy or reddish in long stout almost glabrous, terminal panicles; branches more or less flattened and angular. *Calyx* segment small, round (not punctate). *Corolla* lobes .16 in. long (not punctate). *Anthers* with red glandular dots. *Fruit* globose, .2 in across, longitudinally ribbed.

KAMRUP, KHASI HILLS, ascending up to 2,000 ft.

Flrs. 4. Fr. 10.

16. *Ardisia macrocarpa* Wall.

A single stemmed shrub usually growing in shade or as an under-growth. *Leaves* 3.5-5 by .8-1.2 in., lanceolate, acute crisply crenate, membranous, glabrous with a row of marginal dots; lateral nerves obscure; base narrowed into a short petiole .1-.2 in. long. *Flowers* pinkish, fairly large in axillary peduncled umbels at the ends of branchlets, often in sub-terminal or terminal panicles; pedicels minutely rusty. *Calyx* segments about .25 in. long, oblong. *Corolla* lobes acute. *Fruit* bright red dotted, .3-.5 in. across.

KHASI HILLS, ascending up to 5,000 ft.

Flrs. 7. Fr. Cold weather.

17. *Ardisia crispa* A. DC. sp. *A. crenata* Roxb.

A small shrub; branches verrucose; bark brownish. *Leaves* 1.5-5.5 by .5-1.3 in., elliptic-lanceolate or lanceolate acute or shortly acuminate, serrulate or crenulate, thinly chartaceous, glabrous, dark-green above, paler beneath with prominent dots scattered over the whole blade; petiole .1-.2 in. long; lateral nerves 7-9 on either half, slender. *Flowers* small in simple or compound umbels often corymbose, subterminal or from old stem; pedicels slender, .3 in. long. *Calyx* segments ovate, .1 in. long, specked with orange dots. *Corolla* lobes ovate-acuminate, unequal, whitish with purplish orange dots. *Filaments* short; anthers large,

acute, punctate. *Ovary* ovoid. *Berries* purplish, .15-.3 in. across.

KHASI HILLS, ascending up to 4,000 ft.

Flrs. 1-6. Fr. Cold season.

18. *Ardisia virens* Kurz Vern. *Soh-bumro*, Abor; *Sidum-asing*, Miri.

A small single stemmed shrub with spreading branches. *Leaves* 4-7 by 1.5-3 in., elliptic-oblong or oblong-lanceolate, crispy-crenulate, shortly acuminate, chartaceous, glabrous; lateral nerves numerous, slender, more or less parallel, midrib prominent beneath; tertiaries thin and very lax; base cuneate; petiole .1-.3 in. long. *Flowers* medium, pinkish, showy, in umbels arranged in terminal or sub-terminal (ends of arrested apex of branches) glabrous corymbs; peduncle up to 1.75 in. long. *Calyx* segments herbaceous, elliptic-ovate, obtuse, speckled with black dots. *Corolla* lobes .3 in. long, ovate, shortly acuminate, black-dotted. *Berries* size of a pea, globose, yellowish, smooth, speckled with prominent dark-purplish dots.

N.-E. Frontier, NAGA HILLS, KHASI HILLS.

The fruit is often strung up in rosary.

Flrs. 6-7. Fr. 12.

19. *Ardisia odontophylla* Wall.

A small shrub (3-6 ft. high). *Branches* semi-herbaceous; branchlets rusty, puberulous when young. *Leaves* 3.5-6.5 by 1.3-3 in., elliptic, sharply and finely serrate, acute, membranous, almost glabrous, somewhat puberulous on the midrib; lateral nerves about 14 on either half, sub-parallel, prominent; base acute; petiole up to 2 in. long. *Flowers* in simple or compound lax, few flowered racemes arising from the naked stem towards the apex of the branchlets; pedicels slender, .2-.4 in. long; bracts linear, .4 in. long; buds .2 in. long. *Calyx* small, ovate; segments about .2 in. long. *Fruit* globose, .25 in. across, scarlet.

CACHAR, NAGA HILLS, Patkai mountains, K. & J. HILLS, ascending up to 4,000 ft.

Flrs. 6-7. Fr. 1.

5. SADIRIA Mez.

Shrubs or trees. *Inflorescence* axillary in rusty sessile umbels, racemes or corymbs. *Flowers* minute, hermaphrodite, 5-merous. *Calyx* $\frac{1}{3}$ connate; segments hairy or ciliate or serrulate at the margins, punctate or lanceolate. *Corolla* tubular, cylindric or urceolate; lobes sub-symmetric, ovate or triangular, acute, scarcely emarginate, rather small. *Filaments* short. *Ovary* globose; style simple; stigma minutely punctate; placenta conical; ovules about 5, uniseriate. *Fruit* baccate, sub-globose; endocarp, crustaceous; albumen ruminant, horny; embryo cylindric, transverse, curved.

The genus *Pimelandra* according to the latest literature I can find on the subject *viz.* *Index Kewensis* and *Das Pflanzen-reich* has been now changed into *Sadiria* by Mez. The genus should therefore be called *Sadiria* Mez.

Sepals triangular, ovate, densely ciliate :—

Fruits perfectly globose.	..	..	1. <i>S. eugeniifolia</i> .
Fruits assymetric, ellipsoid.	..	..	2. <i>S. Griffithii</i> .
Sepals triangular, margins serrulate.	..	3.	<i>S. Bourri</i> .
Sepals elliptic, remotely ciliate.	..	..	4. <i>S. erecta</i> .

1. *Sadiria eugeniifolia* (Wall) Mez.

A shrub or small tree; stem with zigzag horizontal spreading branchlets. *Leaves* 4-9 by 1.5-2.5 in., oblong-lanceolate, elliptic-oblong or obovate, crenate or distantly toothed, caudate-acuminate, thinly chartaceous, glabrous, scarcely hairy on the midrib beneath, conspicuously, gland-dotted beneath; lateral nerves about 12 on either half, arched, very prominent beneath; base acute or rhomboid; petiole .2-.3 in. long. *Flowers* .16 in. long, in short axillary rusty pubescent, corymbose or sub-simple racemes; bud .12 in. long; pedicels hairy, .12 in. long; bracts minute, caducous. *Calyx* segments ovate, sub-acute, hairy, outside reddish. *Corolla* campanulate; lobes assymetric, triangular. *Ovary* ovoid; stigma punctiform; ovules few in horizontal line on the conical placenta. *Berries* globose, bright red, .2 in. across.

KHASI HILLS, 2-4,000 ft. Common.

Flrs. 4-5.

2. *Sadiria Griffithii* (Clarke) Mez.

An erect shrub; branches rusty puberulous at the ends. *Leaves* 7·5 by 2·5 in., elliptic or broadly lanceolate, acuminate, sub-entire, glabrous above, rusty villous on the midrib beneath; gland dots very minute; lateral nerves conspicuous; petiole ·4 in. long. *Inflorescence* corymbose, rusty pubescent. *Flowers* small. *Calyx* segments dorsally tomentose. *Corolla* lobes sub-symmetric, triangular, ovate, rotundate; anthers sub-sessile. *Ovary* ovoid; style simple; stigma punctiform. *Berry* red, globose, ·2 in. in across.

ASSAM (South East) Patkoi 4,000 ft.

(Griffith's No. 3598).

3. *Sadiria Bourri* Dunn.

A glabrous bushy shrub with slender branchlets. *Leaves* 4·5·5 in. long, ovate-acuminate, margins entire to undulate; glands red scattered about, specially near the margins; lateral nerves 12-13 on either side, prominent beneath; petioles usually ·6-2 in. long. *Flowers* in short cymes ·6·8 in. long, aggregated and drooping from the leaf axils. *Calyx* segments 5, slightly connate at the base, triangular, margins serrulate, about ·05 in. long. *Corolla* contorted in bud; tube about double the length of lobes, which are oval and rather fleshy. *Stamens* 5, a little shorter than the corolla; filaments short, inserted towards the base of the corolla tube. *Ovary* globose; style slender, slightly exceeding the corolla; stigma punctate; ovules 5, uniseriate. *Fruits* not known.

Abor Hills-summit of Bapu.-Burkill.

4. *Sadiria erecta* (clarke) Mez.

A small shrub, erect; branches ferruginous-tomentose towards the ends. *Leaves* 3·5 by 1·5 in., narrow-elliptic or elliptic-oblong, shortly acuminate, more or less obscurely toothed or sub-entire, chartaceous, almost glabrous; lateral nerves not conspicuous, gland dots scattered; base cuneate or narrowed into the petiole ·4 in. long. *Inflorescence* fascicled on short spurs from the base of tufts of small bracts; pedicels about ·3 in. long. *Calyx* segments ·12 in., elliptic-

oblong. *Corolla* small; lobes rotundate. *Berry* .25 in. across, globose.

KHASI & JAINTIA HILLS-3,000 ft. (Clarke No. 19384).

6. HYMENANDRA A. DC.

Hymenandra Wallichii A. DC.

A stout simple stemmed low shrub. *Leaves* almost sessile, 8-11.5 by 2.3-3.5 in., obovate-oblong, crenate-dentate, membranous, glabrous, gland-dotted; lateral nerves slender, numerous, about 30-40 on either half more or less parallel, arched towards the margins. *Flowers* 5-merous, pinkish in subsessile compound, bracteate, umbels on lateral short branchlets (peduncles?); bract foliaceous (in mature form of the leaves) about 3 by .7 in. long; pedicels about .5 in. long, rusty pubescent. *Calyx* segments ovate-acute, punctate. *Corolla* lobes narrow-lanceolate, twisted, punctate. *Stamens* on the throat of the corolla; filaments short; anthers ovoid, connective united into a tube by membranous edges. *Ovary* globose; style filiform; stigma punctiform. *Seeds* solitary, globose; albumen wrinkled.

SYLHET, NAGA HILLS, KHASI HILLS, 3,000 ft., UPPER ASSAM, CACHAR.

Flrs. 4-6. Fr. Cold season.

7. AMBLYANTHUS A. DC.

Trees or shrubs, compound. *Leaves* alternate, petioled, margins glandular. *Flowers* bisexual, small, 5-merous; buds obtuse. *Calyx*-segments obconic, imbricate. *Corolla* lobes obovate, emarginate, contorted in bud. *Stamens* 5; filaments short; anthers ovate, connate by their edges, introrse, dehiscent inwards in slits. *Ovary* glabrous, ovoid or ellipsoid; style elongate; stigma small, discord; ovules on a globose placenta. *Fruit* globose; endocarp crustaceous; albumen ruminated; embryo elongate; cylindric, transverse.

Inflorescence umbellate at the ends of branchlets :—

- | | | | |
|--|----|----|-------------------------|
| Sepals connate up to the middle . | .. | 1. | <i>A. glandulosus</i> . |
| Sepals scarcely more than $\frac{1}{2}$ connate. | .. | 2. | <i>A. prætervisus</i> . |
| Inflorescence axillary or apparently lateral. | .. | 3. | <i>A. multiflorus</i> . |

1. *Amblyanthus glandulosus* Roxb. A. DC.

A small shrub, glabrous. *Leaves* 2·5-8·5 by ·7-2·5 in., narrow-lanceolate, shortly acuminate, shallowly crenate or slightly dentate, often glandular toothed, membranous, glabrous with raised dots beneath, often a belt of dots along the margins; lateral nerves slender, numerous; midrib more prominent beneath; base acute or cuneate, sometimes oblique; petiole ·2-·6 in. long. *Flowers* small on a umbellate panicle arising from the terminus of naked branchlets; peduncles slender, 1-2 in. long; pedicels short. *Buds* obtuse. *Calyx* segments ·06 in. long, triangular, punctate acute. *Corolla* ·8-·1 in. long; lobes obovate, emarginate, punctate, recurved in flower. *Anthers* connate by their edges into a tube. *Ovules* 3-4 in one line on the globose placenta. *Fruit* globose, ·25 in. across, obscurely striate.

SYLHET, KHASI HILLS, ascending up to 3,000 ft.

Flrs. 7. Fr. 11-12.

2. *Amblyanthus prætervisus* Mez. n. sp.

Branches slender, glabrous. *Leaves* about 5·5 by 1·5 in., broadly lanceolate, amucinate, glandular toothed, thinly membranous, glabrous. *Inflorescence* appearing to be composite but actually umbellate, shortly pedunculate; rachis few flowered, glabrous. *Calyx* scarcely more than $\frac{1}{3}$ connate the middle. *Berry* globose, about ·3 in. across.

KHASI HILLS, (Hk. f. & T)

3. *Amblyanthus multiflorus* Mez. n. sp.

Branches rather thick, glabrous. *Leaves* about 7 by 1·75 in., broadly lanceolate-elongate, acuminate-undulate, crenate, thinly membranous. *Inflorescence* paniculate, axillary or apparently lateral. *Calyx* and corolla about $\frac{1}{3}$ connate.

ASSAM, (Griffith No. 3564).

8. ANTISTROPHE A. DC.

***Antistrophe oxyantha* A. DC.=*Ardisia oxyantha* Wall.**

Single stemmed shrub with horizontal spreading branches; stem whitish. *Leaves* 3-7 by 1-2 in., oblong or oblong-

lanceolate, tapering into a blunt tail, entire, thinly chartaceous or membranous, glabrous, often with raised black dots above; lateral nerves 10-14 on either half, arched, more prominent below; base cuneate; petiole .25-.8 in. long. *Flower* buds long, narrowed into a beak. *Calyx* segments puberulous, lanceolate, persistent, gland-dotted. *Corolla* lobes twisted, overlapping to the left, gland-dotted. *Filaments* short; anthers free, opening longitudinally, connective produced upwards in a membranous wing. *Ovary* ovoid; style filiform; stigma punctiform. *Fruit* globose, .25-.3 in. across. *Seeds* solitary; albumen ruminant; embryo transverse.

LUSHAI HILLS, SYLHET, GARO HILLS, ascending up to 4,000 ft.

Flrs. and Fr. throughout the year. Fr. Chiefly 4-6.

(This is *Ardisia oxyantha* Wall. Cat. (1830) No. 2275).

9. AMBLYANTHOPSIS Mez.

Amblyanthopsis membranacea Mez.

A small shrub; branches graceful flower bearing, often pubescent. *Leaves* 4 by 1-2 in., lanceolate or oblong-lanceolate, acuminate, coarsely and crisply crenate, membranous, glabrous, gland-dotted; nerves prominent; base acute; petiole .25 in. long. *Inflorescence* few flowered, simple, sub-corymbose, pendulous or nodding; pedicels .12-.15 in. long. *Flowers* .08-.2 in. long, glabrous. *Calyx* segments ovate, elongate, connate, membranous, punctate. *Corolla* lobes large, sub-orbicular, depressed irregularly, undulate, emarginate, punctate. *Anthers* free; filaments linear-long, flattened, small, ovate. *Ovary* small, ellipsoid-club-shaped, gland-dotted; style long, fleshy, cylindrical; stigma broadly truncate. *Fruit* globose, black, not striate. *Seeds* large, very few.

SYLHET, CACHAR, KHASI HILLS.

Flrs. 6.

FAM. 81. SAPOTACEÆ.

Trees or shrubs, generally evergreen, often with yellowish milky juice; young parts usually rusty tomentose. *Leaves* entire, usually alternate, coriaceous, petiolate, generally exstipulate or stipules very caducous. *Flowers* hermaphrodite, axillary, pedicellate, clustered, rarely solitary or paniced. *Bracts* or bracteoles 0 or minute. *Calyx* inferior, persistent; segments 4-8, imbricate or biseriate and outer series valvate. *Corolla* tube short; lobes as many or 2-4 times as many as the calyx-segments. *Stamens* on the corolla tube as many as the corolla lobes, epipetalous or 2-3 times as many, 1-3 seriate; filaments short; anthers oblong-lanceolate, connectives often produced; staminodes alternate with the stamens. *Ovary* superior, sessile, 2-8 celled (11-12—Brandis); style subulate; stigma usually punctiform; ovules solitary in each cell, attached to the inner angle (anatropous). *Fruit* 1-8 seeded, baccate. *Seeds* ellipsoid or compressed; hilum conspicuous; testa usually crustaceous; exalbuminous with large fleshy cotyledons or albuminous with flat cotyledons; radicle inferior.

Calyx segments 1-seriate, imbricate; stamens 5-6:—

Staminodes 0. Main secondary nerves of leaves close parallel.	1. Chrysophyllum.
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Staminodes alternating with stamens, nerves distant, conspicuous.	2. Sideroxylon.
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Staminodes present; flowers paniced.	3. Sarcosperma.
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Calyx segments biseriate, outer ones valvate:—

Calyx segments 4:—

Seeds albuminous. Stamens 12 or more.	4. Madhuca.
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Calyx segments 6-8:—

Staminodes 0. Seeds exalbuminous.	5. Palaquium.
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Staminodes 6 or 8. Seed albuminous.	6. Mimusops.
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1. CHRYSOPHYLLUM Linn.

Chrysophyllum Roxburghii G. Don. Modern name *Donella Roxburghii* (G. Don.) Purre. Cf. Parker in I. F.

1931: 490. Vern. *Bonpitha*, Ass.; *Thaibon-buphang*, Kach.; *Theipabon*, Kuki.

An evergreen tree (70'/118'') exuding milky juice; young parts rusty or tawny pubescent with very dark foliage. *Bark* ash grey and somewhat rough outside, reddish below the cork, very light brown soft and somewhat gummy inside. *Leaves* exstipulate, distichously spreading, 2-5 by 1-2 in., oblong-lanceolate or elliptic-oblong, caudate or abruptly acuminate, shining, glabrous; lateral nerves very numerous, close with fine intermediate ones, sub-parallel, conspicuous, uniting within the margin; base cuneate, rounded, often unequal sided; petiole short, .1-.2 in. long. *Flowers* small, shortly pedicellate, about .2 in. in dense axillary capitate clusters. *Calyx* 5-partite; segments sub-equal, obtuse, imbricate, rusty-fugacious pubescent. *Corolla* campanulate, 5-lobed (rarely 6); lobes imbricate in bud, ciliate. *Stamens* united in the corolla-tube; filaments linear; anthers included, dehiscence sublateral or introrse; staminodes 0. *Ovary* 5-6-celled, villous; style glabrous; stigma 5-lobed. *Berry* rusty tomentose when young, yellow and soft when ripe, obscurely 5-6 ridged, globose, about 1.5 in. across. *Seeds* 5-6, compressed, ellipsoid; testa coriaceous; hilum elongate; albumen fleshy; cotyledons flat.

LAKHIMPUR, NOWGONG, CACHAR, SYLHET, N. C. HILLS, GOALPARA, KHASI & JAINTIA HILLS, ascending up to 3,000 ft.

The fruit is edible. Wood white, close grained, moderately hard, pores small in radial lines; med. rays numerous, very fine (Gamble). Weight 36 lbs. P=476 (Bourdillon). The wood may be used for building purposes.

Flrs. 4-5. Fr. Cold season.

2. SIDEROXYLON Linn.

Trees (rarely shrub). *Stipules* 0. *Flowers* small in axillary fascicles; pedicels pubescent, villous or tomentose. *Calyx*-segments 5-6, imbricate. *Stamens* 5-6, opposite to corolla lobes and attached to the tube or at its base; filaments short or linear; anthers ovate or lanceolate; staminodes sometimes petaloid. *Ovary* usually villous, 5 or rarely fewer celled; style cylindric; stigma small; ovules usually solitary, rarely more. *Fruit* an ovoid or globose berry, 5 or fewer

seeded; albumen fleshy; cotyledons flat, foliaceous or almost fleshy.

Flowers large; corolla .25 in. or more; filaments short; calyx segments blunt; buds obtuse :—

Branchlets and under side of leaves rusty pubescent. 1. *S. Hookeri*.

Branchlets glabrous, tips rusty villous. 2. *S. grandifolium*.

Flowers small, corolla less than .16 in.; calyx segments acuminate; buds narrow, tips conical :—

Branchlets villous :—

Leaves crowded at the extremities of the thick branchlets. 3. *S. assamicum*.

1. *Sideroxylon Hookeri* Clarke. Vern. *Dieng-soh-pho-shree*, Synt. (=Monkey's crab-apple).

Tree (35' /42"). *Bark* dark-grey, softly corky, rather closely fissured; inside light red, .12 in. thick; spines large only on branches, generally simple, exudes milky juice. *Ends* of branchlets rusty villous. *Leaves* 2-5 by 1-2 in., elliptic-lanceolate, subcoriaceous, rusty pubescent when young, soon becoming glabrescent or glabrous on maturity with a few hairs on the midrib underneath; lateral nerves prominent below, 11-13 on either half; base narrowed into the petiole .3-.5 in. long. *Pedicels* villous. *Calyx*-segments blunt, silky. *Corolla* about .3 in. long. *Anthers* exerted. *Staminodes* densely hairy. *Ovary* densely villous. *Fruit* oblong or ellipsoid, 2 by 1 in., one seeded, terminated by style (.5 in. long).

KHASI & JAINTIA HILLS, (R'song Forests—U. Kanjilal No. 6468).

Wood light, pale-brown, moderately hard, mottled in long section, takes a fine polish. Weight about 58 lbs. Should be used for building, construction and furniture.

Flrs. 3-4. Fr. 4-5.

2. *Sideroxylon grandifolium* Wall. Vern. *Rosintaito*, Kuki; *Thaipobuon*, *Korberu*, Lushai.

A large tree (90'/65"); stem buttressed. *Bark* grey, somewhat rough with very shallow fissures and horizontal

wrinkles about 1 in. thick, light dun inside, somewhat granular near the outer edge of the blaze, exuding white milk from the inner layer. *Leaves* crowded at ends of branches 5-10 by 2-4.5 in., obovate or oblanceolate, apex blunt, glabrous; lateral nerves 8-10 on either half, depressed above, prominent beneath; base cuneate; petiole up to 1.5 in. long, swollen at the base. *Flowers* small, greenish-white, sessile or sub-sessile, commonly on the old wood below the leaves in dense clusters on wart-like tubercles above the leaf-scars. *Calyx*-segments imbricate, blunt, nearly glabrous. *Corolla* longer than the calyx. *Filaments* short; staminodes whitish. *Fruit* almost sessile, globose or pyriform, about 3 by 2.5 in., exuding milk, 5 seeded, yellow when ripe.

LUSHAI HILLS, CACHAR, N. C. HILLS, KHASI & JAINTIA HILLS.

Flrs. 4-5. Fr. Cold season.

3. *Sideroxylon assamicum* Clarke. Vern. *Dieng-soh-manong-ksui*, Khasi.

Tree (40'/33''), stem very deeply and irregularly fluted, covered with stout compound spines, milky saps scanty. *Bark* greyish-brown outside; inside pinkish-white, rather soft, .1 in. thick, somewhat sweetish and aromatic like liquorice. *Leaves* 2-9 by 1.5-2.7 in. with milky sap, broadly lanceolate or elliptic-acuminate, subcoriaceous, usually glabrous above, ferruginous floccose tomentose beneath, especially along the nerves; lateral nerves prominent beneath, 10-18 on either half; base cuneate or rhomboidal; petiole .1-1.5 in. long. *Flowers* dull-white in dense axillary clusters. *Calyx* lobes ovate, acuminate, inferior, villous outside. *Corolla* lobes acute, nearly glabrous. *Anthers* exserted; staminodes linear-lanceolate, hairy. *Berry* 1-2 seeded, superior, globose, oblong or ovoid, about 1-1.25 in. across; exocarp fleshy. *Seeds* dark-brownish or slaty, shining, compressed, somewhat pointed at both ends (.6 by .3 in.) with an elongated hilum.

KAMRUP & KHASI HILLS.

Wood similar to *S. Hookeri*, but lighter. Cracks in seasoning.

Flrs. 4. Fr. 10.

3. SARCOSPERMA Hook. f.

Evergreen trees. *Leaves* coriaceous, sub-opposite; stipules caducous. *Flowers* small, 5-merous, clustered on the branches of a simple or compound axillary panicle; bracteoles minute. *Calyx* segments sub-equal, orbicular, fully imbricate. *Corolla* tube short; lobes round, imbricate. *Stamens* on the corolla tube; filaments short; anthers obtuse, oblong; staminodes 5, alternating with the stamens. *Ovary* 1-2 celled, glabrous; style cylindric; ovules ascending. *Berry* ellipsoid, 1-2-seeded; testa crustaceous, exalbuminous; hilum nearly basal; cotyledons fleshy.

Panicles and calyx pubescent. Leaves about 9 by 2 in., gland pitted at the nerve axils. .. 1. *S. arboreum*.
Panicles and calyx glabrous. Leaves about 5 by 1.2 in., not gland pitted at the nerve axils. 2. *S. Griffithii*.

1. **Sarcosperma arboreum** Benth. Vern. *Thirkal-wang*, *Dumuk-nachil* (Goat's ears), *Bol-subok*, Garo; *Dieng-thelaudi*, *U-soh-sarloh*, Khasi.

A large tree (80'/12'') with spreading crown. *Bark* greenish-grey, softly corky, slightly reticulately furrowed; inside fibrous, light brown, exuding white juice; blaze light red. *Leaves* almost opposite, very rarely alternate, bifarious, 3-10 by 1.3 in., narrowly oblong-lanceolate, acuminate, glabrous, gland pitted at the nerve axils; lateral nerves prominent below, 8-10 on either half, tertiaries prominent, transverse to midrib, sub-parallel; petiole .2-.7 in. long. *Flowers* fragrant (like *Mimusops Elengi*), .17-.25 in. across, yellowish or pale white, densely clustered in axillary or supra-axillary pubescent panicles. *Calyx* pubescent outside, segments persistent, deflexed in fruit. *Stamens* opposite to corolla lobes; staminodes obscure. *Fruit* with a glaucous bloom, gives out milky juice when cut, size of fruits varying according to its being 1-seeded or 2-seeded.

GARO HILLS, N.-E. F. TRACT, GOALPARA, N. C. HILLS, SIBSAGAR, SYLHET, KHASI & JAINTIA HILLS up to 4,000 ft.

Wood pinkish, moderately hard, pores moderate sized; med. rays very numerous, fine, equidistant, concentric lines indistinct. Weight

30 lbs. per c. ft., may be used for building, construction and making dug-outs.

Flrs. 12-2. Fr. 6-7.

2. *Sarcosperma Griffithii* Benth. Vern. *Dieng-tyrbu-ladeu*, *Dieng-n̄ng-jalasao*, Khasi; *Dieng-ja-lyt-pai*, *Dieng-kymbu-blang*, Synt.

Tree (45'/30"). *Bark* brownish-grey, covered with soft spongy cork with very flat lenticels, soft light pinkish inside, exuding copious milky sap. *Branchlets* green, spines large, only on branches, generally simple; blaze light red; all parts including calyx and inflorescence glabrous. *Leaves* almost opposite, 4-7 by 1-1·8 in., lanceolate to elliptic-lanceolate; lateral nerves 6-10 on either half, arcuate, no gland pits at the axils, tertiaries transverse to the midrib; petiole 2·5 in. long. *Flowers* 3 in. across, light dun-white, scented, more or less whorled on a short axillary glabrous raceme, which is sometimes panicled near base. *Calyx* divided nearly to the base, glabrous; segments more or less ciliate. *Corolla* lobes broadly obovate. *Stamens* inserted opposite the corolla lobes; staminodes alternating with corolla lobes. *Ovary* usually 2-celled; style subulate with minute protuberances towards the apex. *Fruit* about 1 in. long, oblong, reddish brown when fully ripe (with 2 large seeds, transversely plano-convex or one oblong and conforming to the fruit), brown, smooth, fleshy-grey, sweetish.

NOWGONG, KHASI HILLS, up to 5,000 ft.

Flrs. 11-12. Fr. 4-7.

4. MADHUCA Linn. (*Bassia* Linn.).

***Madhuca butyraceoides* Scott.** Modern name *Manilkara hexandra* (Roxb.) Dubard.

A middle sized tree. *Leaves* clustered towards the ends of branchlets, 6-10 by 2-3·5 in., elliptic-oblong or obovate-oblong, glabrous, chartaceous; lateral nerves 23-25 on either half, sub-parallel, slightly arcuate at the margin, tertiaries not very conspicuous; base narrowed into the petiole, unequally sided, oblique; petiole up to 1·8 in. long; stipules caducous. *Flowers* pale-yellow, clustered near the tops of the branches.

axillary or from the scar of the fallen leaves. *Calyx* segments 5-6, imbricate; tube very fleshy, rusty tomentose. *Corolla* tomentose; lobes up to 16, reflexed, not fleshy. *Stamens* 70-80; filaments first connate into bundles of 6 then into larger bundles, ultimately forming a more or less continuous ring, floccose not glabrous. *Ovary* glabrous; style glabrous, long exserted. *Fruit* a berry; albumen 0.

N.-E. F. TRACT (Nizamghat No. 3137, U. Kanjilal) up to 1,200 ft.

Flrs. 10-12. Fr. 2.

The plant was first discovered by the late Rai Bahadur U. N. Kanjilal in 1913 in Sadiya Frontier Tract and he considered it a new species of *Bassia* (*Madhuca*).

5. PALAQUIUM Blanco. (Isonandra)

Trees with milky juice. *Leaves* usually coriaceous, petiolate, often minutely rusty tomentose beneath. *Flowers* 6-merous, pedicellate, fascicled in the axils of leaves or of the scars of fallen leaves. *Calyx* segments in two series, the outer 3 valvate, the inner imbricate. *Corolla* lobes 6, imbricate or contorted in bud. *Stamens* 12-18, attached to the base of the corolla, 1 seriate or the attenuate row inserted higher up; anthers lanceolate, extrorse or with lateral dehiscence; connective produced beyond the cells, acute or bifid; staminodes 0. *Ovary* villous, 6-celled; style linear. *Fruit* fleshy, ovoid or ellipsoid, 1-2 seeded. *Seeds* exalbuminous; testa crustaceous; cotyledons large, fleshy.

Leaves dun-felted beneath, glabrescent when mature. Fruit obovoid. Flowers in axillary fascicles.

Leaves entirely glabrous. Fruit globose.

Flower clusters, as a rule, from above the scar of fallen leaves.

1. *P. polyanthum*.

2. *P. obovatum*.

1. Palaquium polyanthum Benth. Vern. *Kurta*, Sylh. & Cach. *Kherual*, Lushai & Kuki; *Bonthai pionbuphang*, Kach.; *Kerbal*, Tipp.; *Dieng-horua*, Khasi; *Salua*, Garo.

A large tree. *Bark* dark-brown with horizontal patches of greenish-white 2-3 in. thick, inside dull white with

streaks of light red exuding milky juice. *Branchlets* thin, horizontal. *Leaves* 4-9 by 2-3 in., crowded at ends of branchlets, ovate-oblong, bluntly acute or obtuse, dull-felted beneath, glabrescent on maturity; lateral nerves numerous, not very conspicuous, sub-parallel; base cuneate; petiole up to 1.5 in. long. *Flowers* fragrant, in axillary fascicles; pedicels 1.5 in. *Calyx*-segments .3 in. long. *Corolla* cream coloured, a little larger than the calyx. *Stamens* 12, occasionally more. *Berry* 1.5 in., obovoid, velvety brown, 1-seeded.

CACHAR, SYLHET, GARO HILLS, K. & J. HILLS.

Wood reddish hard, pores moderate sized in wavy radial lines; med. rays very fine, not prominent (Gamble). Weight 53 lbs. per c. ft. Much prized in Surma Valley as a timber for all general purposes. Said to yield a quality of *Gutta Percha*. Kernel of fruit eaten by monkeys.

Flrs. 3-5. Fr. 5-6.

2. *Palaquium obovatum* Clarke. Vern. *Kathulua*, Ass.; *Daser-changne*, Duff.; *Wai-to-phang*, Kach.; *Bakri-lapre*, Nep.

A middle sized tree. *Bark* dark-brown, somewhat rough, green below epidermis, white inside but with close reticulated brown veins; young branchlets very tomentose. *Leaves* rather crowded near the ends of branchlets, 5-10 by 2.4 in., obovate, ovate-oblong or elliptic-obovate, acute, glabrescent above, glabrous beneath; midrib strong, channelled above; lateral nerves more conspicuous beneath, 10-12 on either half. more or less parallel, tertiaries obscure; base cuneate; petiole .5-.7 in. long. *Flowers* in dense fascicles, axillary or above the scar of fallen leaves. *Calyx*-segments ovate. *Corolla* glabrous outside, more than twice the length of the calyx; lobes longer than the tube, lanceolate, blunt. *Stamens* exserted; anthers minutely villous; filaments glabrous; style twice the length of corolla. *Berry* .7 in. across, globose.

SIBSAGAR, DARRANG, NOWGONG.

Yields an inferior kind of *Gutta Percha* (Brandis). Old leaves turn yellow before falling.

Flrs. 5. Fr. 7.

P. Gutta Burck is the *Gutta Percha* tree.

6. MIMUSOPS Linn.

Mimusops Elengi Roxb. Vern. *Bakul*, Beng.; *Gokul*, Ass. *Boal*, Sylh.

A large tree generally smaller and handsome in cultivation; young parts rusty pubescent. *Bark* grey, fissured. *Leaves* 2·5-4 by 1·25-2 in., elliptic, acuminate, chartaceous, shining, glabrous; lateral nerves numerous not very conspicuous, perpendicular to the midrib, sub-parallel; base acute or rounded; petiole ·5-1 in. long. *Flowers* 8-merous (rarely 6), about 3 in. across, creamy white, fragrant, star-like, solitary or in fascicles. *Calyx* rarely in two rows (rarely 3+3). *Corolla* caducous, lobes usually 24 in two rows, all lanceolate and almost similar. *Stamens* 8; staminodes rather petaloid, membranous, fimbriate; anthers lanceolate, extrorse, apiculate. *Ovary* hirsute, 6-8 celled; style subulate. *Fruit* rather variable, usually globose, ovoid or ellipsoid, about 1 in. long, yellow orange. *Seeds* usually solitary, ovoid, compressed, slaty brown, shining.

Cultivated or escapes. KAMRUP, SIBSAGAR, CACHAR, SYLHET.

The caducous corollas which fall in showers are held sacred and are very much prized for garlands and a perfume is distilled from them. The bark is used in Indian medicine. An oil is obtained from the seeds. Ripe fruit is edible, it is also very astringent.

Wood dark red, close grained, very hard, strong and durable; pores small, med. rays very fine, very numerous, uniform and equidistant (Gamble). Used for building and other implements. Weight varies averaging about 60 lbs. P.=632 (Skinner).

Flrs. 4-6. Fr. Cold weather.

FAM. 82. EBENACEÆ.

Trees or shrubs. *Wood* usually hard, often with black heart wood; wood fibres have minute bordered pits. *Leaves* usually alternate or rarely subopposite or opposite, entire, coriaceous, exstipulate. *Flowers* regular, 3-7-merous, axillary, solitary or shortly cymose, usually diœcious, bracteate; pedicels articulate. *Calyx* inferior, gamosepalous, persistent, often accrescent in fruit. *Corolla* gamopetalous, contorted, less often imbricate or valvate, attached to the base of tube. *Stamens* in male flowers as many or 2-3 times as many as the corolla-lobes or many; filaments free or paired or variously grouped or connate; anthers narrow, basifixed, usually dehiscing longitudinally, rarely apically; connective often produced. *Stamens* in female flowers reduced to staminodes or absent. *Ovary* superior, sessile, 2-16-celled; ovules 1-2 in each, anatropous, pendulous; style 2-8, free or united below. *Fruit* baccate, coriaceous or fleshy. *Seeds* usually fewer than there were formerly ovules, compressed; testa thin; albumen copious, cartilaginous, often ruminant; embryo axile, straight or slightly curved; radicle superior.

Flowers 4-5-merous. Ovary 4-5 or 8-10-celled. **1. Diospyros.**
Flowers usually 3-merous. Ovary 3- or 6- celled. **2. Maba.**

1. DIOSPYROS Linn.

Trees, rarely shrubs. *Leaves* alternate or sometimes sub-opposite. *Flowers* commonly white, yellowish or green, 4-5-merous, rarely more or less diœcious, rarely polygamous, axillary in cymes or old branches, specially the female usually solitary. *Calyx* usually deeply lobed, rarely truncate, the female often larger than the male. *Corolla* often woody in fruit, various, more or less pubescent outside, twisted to the right in bud. *Male flowers* with 4-many stamens (often 16) often in pairs; pistillode present. *Female flowers* with 0-16 staminodes. *Ovary* 4-5 or sometimes 8-10-celled; ovules usually solitary, rarely 2 in each cell; style

short with spreading or lobed; stigma (1-4). *Fruit* globose, ellipsoid, or ovoidconic, usually showing abortive cells; rind, coriaceous. *Seeds* compressed, immersed in soft or viscid pulp.

Female flowers usually solitary :—

Calyx similar in both sexes. Stamens usually in pairs :—

Male flowers in pedunculate cymes:—

Corolla of male flowers, hirsute.

Leaves membranous, more or less hairy.

1. *D. stricta*.

Corolla of male flowers pubescent or glabrous outside. Leaves thinly chartaceous, tomentose.

2. *D. montana*.

Corolla of male flowers glabrous :—

Leaves membranous, softly pubescent. Stamens 16-24.

3. *D. Kaki*.

Leaves coriaceous, glabrous. Stamens numerous (32-64).

4. *D. Embryopteris*.

Leaves coriaceous, glabrous.

5. *D. Toposia*.

Corolla of male flowers rusty-silky. Stamens 32, tomentose :—

Leaves lanceolate, male flowers sessile.

6. *D. lanceæfolia*.

Leaves ovate-oblong, male flowers pedicelled.

7. *D. undulata*.

Female flowers in many flowered cymes, usually from the old wood :—

Corolla fleshy. Fruit large as an orange.

8. *D. ramiflora*.

Male flowers in small cymes or in clusters.

Stamens about 16 :—

Leaves lanceolate, 2-4 in. long, hairy or almost glabrous. Fruit ellipsoid.

9. *D. nigricans*.

Leaves oblong or elliptic-oblong, 4-10 in., glabrous. Fruit sub-globose.

10. *D. variegata*.

Male and female flowers solitary :—

Stamens 12, glabrous :—

Leaves glabrous except the midrib.

11. *D. pilosula*.

1. *Diospyros stricta* Roxb.

A tall tree (50'); bark plain, blackish brown outside, dark chocolate brown inside; young parts softly tomentose. *Leaves* 1·5-4 by ·6-1·2 in., lanceolate or ovate-lanceolate, acuminate, membranous, dark green above, more or less hairy; main lateral nerves 5-8 on either half, inconspicuous; petiole ·2 in. long. *Flowers* 4-merous, semi-ovoid in small bracteate

cymes. *Calyx*-segments 4, broadly ovate, hardy outside. *Corolla*-lobes contorted about the middle; tube tapering upwards, hairy outside. *Stamens* in 2 series, usually the outer of 10 and inner of 4, the latter almost sessile. *Fruit* egg-shaped, about 1.5 by 1 in. with spinescent horny shell on a stout bracteate stalk .3-.4 in. long; albumen uniform.

KKHASI HILLS (Tharia-U. Kanjilal).

Flrs. 10-11. Fr. 3.

2. *Diospyros montana* Roxb.

A large shrub or middle-sized tree. *Branchlets* and young leaves softly tomentose. *Leaves* 2-4 by 1-1.5 in., ovate or oblong, acuminate, entire, thinly coriaceous, pubescent or glabrescent; lateral nerves very slender; petiole about .2 in. long. *Flowers* white, 4-merous. *Male flowers* in bracteate 2-8 flowered cymes; peduncles short, velvety. *Calyx* 4-partite; segments obtuse, velvety. *Corolla* urceolate or campanulate. *Stamens* 16, female solitary, nodding on short pedicels, larger than male flowers. *Ovary* glabrous, 8-celled, 1 ovule in each cell. *Fruit* bitter, globose, .5-1 in. across, yellow when ripe, supported by the accrescent foliaceous calyx segments; albumen uniform.

Plains of CACHAR (G. Mann's 252).

Fruits not edible.

Flrs. 3-4. Fr. 9-11.

(This form appeared to be *D. Kanjilali Duthie* as described in Ind. For XXXI, page 307).

3. *Diospyros Kaki* Linn. Vern. *Dieng-iong*, Khasi; *Soh-tang-jong*, Synt.; *Halwa-tendu*, Hind.

A tree (55'/35"). *Bark* dark or greyish brown, corky, rough with exfoliating scales (young trees with reticulately furrowed black bark) thin, cinnamon or reddish inside, turning yellow. *Leaves* bifarious, 3-5 by 1-2 in., oblanceolate, obovate or ovate, bluntly acuminate, chartaceous, glabrous, rugulose above, pubescent beneath; lateral nerves 6-8 on either half, very oblique, slightly arched, sunk above, prominent beneath; tertiary nerves very delicately reticulated;

base narrowed into the petiole; petiole up to .3 in long. *Male flowers* small, shortly pedicellate in small cymose clusters. *Calyx* deeply 4-cleft; stamens pilose, 16-24. *Female flowers* solitary. *Calyx* shaggy outside, about 1 in. across in fruit. *Corolla*-tube glabrate; lobes pubescent outside. *Staminodes* 8. *Ovary* 8-celled. *Fruit* shining or with a bloom, globose, 2.2-5 in. across, orange red or yellow when ripe, 3-8-seeded. *Seeds* flat; albumen uniform.

NAGA HILLS, KHASI HILLS, also cultivated.
Wood yellowish. Fruits edible.

Flrs. 3-5. Fr. 7-9.

4. Diospyros Embryopteris Pers. Modern name *Diospyros Peregrina* Gurke. *Vern. Gab*, Beng.; *Kendu*, Ass.; *Kendu-arong*, Mik.

A middle-sized handsome evergreen tree with short trunk and spreading crown. *Bark* blackish with numerous white blotches; inside deep red, fibrous; leaf buds silky; young leaves bright crimson. *Leaves* distichous, 4-8 by 1.3-2.5 in., oblong or narrowly oblong, subacute or obtuse, coriaceous, glossy green, smooth, glabrous; lateral nerves slender, obliquely ascending, rather inconspicuous; base rounded; petiole often twisted, .3-.5 in. long. *Flowers* tetramerous, white or cream coloured, scented. *Male flowers* in short pedunculate rusty pubescent cymes of 2-7 flowers; peduncles .3-.5 in. long. *Calyx* .25 in. long, silky pubescent; segments 4, broadly ovate, pubescent within, margins ciliate. *Corolla* .3-.4 in., broadly tubular; lobes fleshy, rounded. *Stamens* many in pairs at the base of the corolla; anthers linear, hairy up to the middle. *Female flowers* usually solitary (or up to 5), subsessile, larger than the male flowers; peduncles pubescent, stout. *Calyx* pubescent outside, deeply divided; segments broadly ovate, subcordate. *Corolla* campanulate; lobes cordate, obtuse, reflexed; staminodes up to 12. *Ovary* 8-celled; style 4-lobed at the tips. *Fruit* globose, 1.5-2.5 in. across, covered with a deciduous ferruginous scurf, turning yellowish when ripe, supported on the much enlarged accrescent calyx. *Seeds* up to 8, compressed, imbedded in a glutinous pulp; albumen smooth.

KAMRUP, NOWGONG also cultivated.

Wood white, moderately hard and close grained, used for building. The pulp of the unripe fruit is very viscid and is used for caulking country boats. An infusion of the pulp is used for dyeing fishing nets and rendering them more durable. The bark and seeds have astringent properties and are used in Indian medicine. The oil extracted from the seeds is also used in Indian medicine.

The ripe fruits are edible, but are too astringent to be palatable.

Flrs. 5-7. Fr. 4-5.

5. Diospyros Toposia Ham. Vern. *Gulal*, Cach. and Sylh.; *Thing-hang*, *makhang*, Lush.; *Thing-bong*; Kuki; *Ponsagusum-baphang*, Kach.; *Theipand-kop*, Tipp.; *Kala-khura*, Sylh.; *Kadeng-jong*, Mik.; *Bolgisim*, Garo; *Dieng-soh-seit-lang-kait*, Khasi.

A large or middle-sized evergreen tree (40'/32"). *Bark* black but with horizontal wrinkles; inside fibrous, .2-.3 in. thick, reddish brown but turning darker, all parts glabrous. *Leaves* bifarious, alternate, 3-10 by 2-3.5 in., elliptic, elliptic-oblong or lanceolate, ovate-oblong, shortly or bluntly acuminate or obtuse, coriaceous, entire, shining, glossy, glabrous; midrib slightly depressed above, prominent beneath; lateral nerves 8-10 on either half, more or less oblique, zig-zagged, finely and elegantly reticulately veined; base obtuse or almost rounded; petiole .3-.6 in. long. *Flowers* white, usually 4-merous; male flowers in axillary short lax pedunculate cymes; female (hermaphrodite?) solitary or subsolitary, usually short and thickly peduncled; buds globose, minutely tubercled. *Calyx* connate in bud, afterwards irregularly 3-4 cleft, spathaceous, similar in male and female flowers; segments recurved in fruit. *Corolla* 4-5-lobed. *Stamens* about 32, glabrous. *Ovary* 4-celled, hairy (rarely 6); stigma 4, sessile. *Fruit* globose, 1.25 in. across, glabrous or glabrescent, usually solitary, very shortly stalked, 3-4-seeded, golden yellow when ripe; albumen uniform.

SYLHET, CACHAR, LUSHAI HILLS, N. C. HILLS, KAMRUP, GARO HILLS, K. & J. HILLS.

Flrs. 4-5. Fr. 12-2.

6. *Diospyros lanceæfolia* Roxb. Vern. *Sateru*, *Chhotro-arong*, Mik.; *Dieng-soh-leu*, Khasi; *Kendu*, Ass.; *Tezu*, Nep.; *Dieng-thang*, Synt.

A middle-sized evergreen tree (50'/48"); young shoots pubescent; branchlets and bark with peculiar pungent smell. *Bark* blackish rough with more or less parallel vertical fissures .3-.5 in. apart, dark chocolate underneath the outer dead bark; inside light rosy pink with edges of white tissue from the depressions of the fissures on the surface; living portion .17 in. thick. *Leaves* 2-farious, 2-8 by 1-3 in., narrow-elliptic or lanceolate to oblong-acuminate, glabrous, shining above, midrib depressed above, conspicuous beneath; lateral nerves slender, inconspicuous, about 16 on either half, wavy; tertiary nerves transverse to midrib, finely reticulate into elliptic masses whose longer axis are transverse to the midrib; base more or less rounded; petiole .2-.6 in. long. *Flowers* 4-5-merous, sessile; male flowers sessile, clustered; female flowers solitary, sub-sessile in axils of fallen leaves. *Calyx* dissimilar in male and female flowers, 4-5-cleft; segments sharply recurved, rusty-tomentose. *Corolla* rusty and silky, .3-.5 in. *Stamens* 16 in pairs; filaments hairy, number of stamens reduced in male flowers. *Ovary* 8-celled, hairy. *Fruit* subglobose or ovoid, astringent, .75-1 in. across, rusty villous, especially when young, supported by the spreading accrescent calyx. *Seeds* up to 7, generally 3.

Wood yellow. It appears that ebony is formed in the species. Fruits are eaten by Nepalese.

SIBSAGAR, NOWGONG, KAMRUP, SYLHET, KHASI HILLS.

Flrs. 4-5. Fr. 12-2.

7. *Diospyros undulata* Wall.

Evergreen tree (80'/96"); branches drooping. *Bark* dark brown, almost black, rough with fissures and irregular scales; inside mottled with rather irregularly scattered yellow strands .25-.3 in. thick; young leaves reddish brown. *Leaves* alternate, 2-farious, 2-8 by 1.5-3 in., narrow-elliptic or lanceolate, entire, acute or acuminate, glabrous above, minutely punctate; midrib depressed above; lateral nerves slender, inconspicuous; base rounded; petiole .3 in. long. *Flowers*

axillary, 4-merous, tomentose, solitary. *Male flowers* solitary, pedicelled, in short bracteate tomentose cymes. *Calyx* cup-shaped; segments triangular, hirsute on both sides. *Corolla* .3-.5 in. long, sub-glabrous without; anthers in pairs 10-14, pistillode rudimentary, hairy;. *Fruit* globose, 1-1.5 in. long, truncate at the apex, villous, supported by the thickened woody calyx.

K. & J. HILLS.

Flrs. 2-3. Fr. 5.

8. *Diospyros ramiflora* Roxb.

Large tree. *Leaves* 4-8 by 1.5-3 in., oblong-elliptic or lanceolate, acuminate, thinly coriaceous, glabrous; lateral nerves 7-10 on either half, very slender, arched, tertiaries horizontal, parallel, very close; base cuneate; petiole .3-.5 in. long, flattened above. *Male flowers* in cymose fascicles. *Calyx* campanulate, hairy outside, about .2 in. long; segments elliptic, longer than the tube. *Female flowers* in many flowered cymes much longer than the male cymes. *Calyx* 5-cleft, nearly half way down. *Corolla* tubular, villous outside. *Stamens* 16, glabrous; staminodes 8-12. *Ovary* hairy, 8-12-celled; stigma 4-6 lobed. *Fruit* globose, glabrous, 2-3 in. across with accrescent calyx 1.5 in. across.

KHASI HILLS (Wallich).

(No specimen in Forest Herbarium, Shillong).

Flrs. 3-4.

9. *Diospyros nigricans* Wall. Vern. Rangkoli, Ass.

Tree (30'/32'') with spreading crown. *Branchlets* grey pubescent; bark blackish brown, greyish white inside, .1-1.2 in. thick; cambium soon turning greenish black; old leaves become yellow and leaves dry blackish. *Leaves* alternate, 2-farious, 1.5-4 by 1-2 in., lanceolate or elliptic lanceolate, bluntly acuminate, subcoriaceous, glabrous, midrib prominent beneath; lateral nerves about 12 on either half, slender, inconspicuous, oblique; base rounded or cuneate; petiole pubescent, .1-.2 in. long. *Male flowers*—calyx deeply 4-fid; segments ovate, subacute, .2 in. long, pilose outside,

margins ciliate, specially towards the apex. *Corolla* about .3 in., deeply 4-lobed; pistillode pubescent, small. *Calyx*-segments ovate, blackish, coriaceous, thinly pilose outside, divided nearly to the base in fruit. *Female flowers*—lobes 4, overlapping to the right. *Fruit* solitary, sub-sessile, ellipsoid, glabrous, 4-celled.

SYLHET, CACHAR, SIBSAGAR, KAMRUP, LAKHIMPUR, N. C. HILLS.

Flrs. 4-5. Fr. 10-11.

10. *Diospyros variegata* Kurz. Vern. *Salkuli*, *Kolonthi*, *Koliori*, *Koilothi*, *Gab*, Ass., *Kadeng-jong-arong*, *Kading-iong*, *Kolti-arong*, Mik.; *Kalikath*, Nep.; *Ponsa-kisimbophang*, Kach.; *Bolgisem*, Garo.

A large tree (80'/96''); branchlets glabrous; stem fluted. *Bark* blackish having deep vertical furrows exfoliating in pieces, exposing similarly coloured surface, .25 in. thick; blaze white turning brown. *Leaves* 4-10 by 2-4.5 in., elliptic-oblong or oblong-lanceolate, unequal sided, occasionally acute or acuminate, coriaceous, glabrous; lateral nerves conspicuous, oblique, 9-11 on either half, reticulation of nerves conspicuous on both sides; base cuneate or acute; petiole .3-.6 in. long. *Male flowers* yellowish white in cymose clusters of 2-8, .66 in. long. *Calyx* deeply 4-cleft. *Corolla* .33 in. long, salver-shaped; lobes as long as tube, nearly glabrous, recurved. *Stamens* 16, unequal; filaments short; anthers glabrous, taper pointed, dehiscing by long lateral slits. *Fruit* solitary, sub-globose, up to 2 in. long.

LUSHAI HILLS, N. C. HILLS, KAMRUP, NOWGONG, SIBSAGAR, DARRANG, LAKHIMPUR, GARO HILLS, K. & J. HILLS.

Flrs. 4-5. Fr. Cold season.

11. *Diospyros pilosula* Wall. Vern. *Leng-poi-ching*, Naga.

A small tree (40'/33''). *Bark* blackish, smooth; inside reddish brown, fibrous, rather hard, somewhat granular, .25 in. thick. *Leaves* bifarious, 1-5 by .7-1.5 in., elliptic-

ovate, oblanceolate or linear, sub-coriaceous, hairy along midrib, otherwise glabrous, often shining underneath; lateral nerves very conspicuous, oblique; base cuneate; petiole .15-.2 in. long. *Female* and *Male* flowers solitary on the stem below the leaves on grey shaggy peduncles; *Calyx* lobes divided almost to the base, lanceolate or linear, slightly longitudinally ribbed, hairy. *Corolla* lobes similar to the calyx segments but shorter, margins ciliate; style 2-partite; staminodes 4. *Ovary* 4-celled, densely hairy, cells 1-ovuled. *Fruit* globose, smooth and red, .5-.6 in. in diameter.

N. C. HILLS, SYLHET, CACHAR, K. & J. HILLS.

Flrs. 1-3. Fr. 5-6.

D. discolor Willd.

A handsome tree. *Leaves* 5-10.5 by 2-4 in., oblong, bluntly acute, coriaceous, glabrous above, minutely punctate, silvery grey beneath along midrib; lateral nerves numerous, very slender and inconspicuous. *Male flowers* scented in short dense cymes. *Calyx* deeply 4-cleft. *Corolla* tubular, densely villous. *Stamens* 22-24, quite glabrous; anthers large; style 4 (Prain). *Fruit* large, ellipsoid, purplish red, velvety.

KAMRUP (cultivated).

Flrs. 4. Fr. Cold season.

D. grata Wall.

A tree. *Leaves* 3-7 by 1-2 in., alternate, oblong-lanceolate, entire, acuminate, coriaceous, glabrous; base rounded; petiole .2-.3 in. long. *Fruit* globose, about 1.5 in. in diameter; fruiting calyx 5-fid. *Seed* 1.2 by .8 in., oblong, compressed.

GARO HILLS, 3,500 ft. (No. 13979), identified in R. B. Garden, Sibpur as above from fruiting specimens.

Fr. (ripe) 6.

D. glandulosa Lace.

A tree; bark greyish-brown. *Leaves* alternate, 4.5 by 2.4 in., ovate-oblong, lanceolate or oblanceolate, obtuse or acute, characeous; lateral nerves 5-6 on either half, arcuate, anastomosing with the inter-marginal nerves, impressed above, prominent beneath; base shortly cuneate or narrowed into the petiole; petiole .4 in. long, densely brown-pubescent. *Flowers* male: in cymes of 3-6, pubescent; buds broadly ovoid; calyx .25 in. long; segments 4, oval or triangular, acuminate; corolla urceolate, .32 in. long; lobes contorted, emarginate; stamens about 25 or some-times less, some-times cuneate; interior anthers

sessile. *Flowers* female: solitary; calyx 4-fid; tube short; segment orbicular, pubescent; corolla urceolate, tube .2 in. long; lobes .4 in. long, similar to male flowers; staminodes 12, sessile; anthers linear, acute, villous; ovary densely brownish pubescent, 8 locular; style 4, villous; stigma bifid. *Fruit* 1 in. across, globose with accrescent persistent calyx.

(Kew Bulletin 1915-349).

2. MABA J. R. & G. Forst.

Maba cacharensis Das et Kanjilal Sp. Nov.

A small tree attaining 30-40 ft. in height. *Bark* black or dark brown, .1 in. thick; young parts pilose with straight fuscous hairs. *Leaves* bifarious, often with a few diminutive ones towards the base of the branches 1.5-7 by .3-2 in., oblong-lanceolate or lanceolate, acuminate, membranous, entire, ciliate, upper surface thinly and under surface more densely pilose, specially along the nerves; lateral nerves 7-14 on either half, subarcuate, prominent beneath; tertiaries fine, scalariform; base rounded; petiole short, pilose, .05-.1 in. long; stipules 0. *Flowers* unisexual, diœcious, 3-merous. *Males* (buds only seen) in 9-12 flowered peduncled cymes from the axils of leaves; peduncles .2-.4 in. long, slender. *Bracts* .25-.4 in., linear to ovate-lanceolate, sub-persistent; bracteoles similar, but smaller. *Calyx* 3-fid; segments pilose outside, glabrous within, broad ovate; tube short. *Corolla* 3-partite to nearly the base, pilose on the back; segments broadly ovate, subequal. *Stamens* 6-9. *Female flowers* .33 in. long, on stout 8-25 flowered racemes from old wood, which are fascicled, rarely solitary and .8-1.8 in. long; rachis of inflorescence stout; bracts lanceolate-subulate, .12-.2 in. long, sub-persistent; pedicels stout, .1-.12 in. long and nearly as long as or slightly longer than broad, suborbicular or broad-ovate, acute. *Corolla* .2 in. long, dull white, thinly pilose on the back, 3-lobed; segments .1 in. across, recurved in mature flowers. *Staminodes* 3, .1 in. long. *Ovary* densely pilose, 6-celled, .17 in. long; stigma deeply 3-fid, somewhat laciniate. *Fruit* about 1.5 by 1.2 in., glabrous, ovoid with a short beak seated on the persistent but scarcely accrescent calyx.

ASSAM, CACHAR—Borail Reserve No. 5716 (U. N. Kanjilal), No. 10548 (A. Das), LAKHIMPUR—Dulong Reserve No. 3653 (U. N.

Kanjilal—Herb, Shillong), KHASI HILLS—Nongkhlaw 1150 m. C. B. Clarke No. 18115 (Herb. Royal Botanic Garden, Calcutta).

Flrs. Hot season. Fr. Rainy season.

M. nigrescens Dalz. Vern. *Theng-prangke-arong*, Mik.

A large shrub or small tree; young parts fulvous hairy. *Leaves* 1-2 in. long, elliptic-lanceolate, chartaceous; midrib and veins conspicuous. *Ovary* 3-celled. *Fruit* ellipsoid.

N. C. HILLS (No. 6796), only leaf specimens; identified in R. B. Garden, Sibpur as above.

FAM. 83. STYRACEÆ.

Trees or shrubs; stellate hairs and peltate scales are frequent. *Wood* fibres have bordered pits. *Leaves* alternate, simple, exstipulate. *Flowers* regular, hermaphrodite, 4-5-merous in axillary and terminal simple or compound racemes or spikes, rarely solitary; bracts small. *Calyx* persistent, campanulate, superior or inferior, toothed or truncate. *Corolla* free or connate, imbricate. *Stamens* 8-10 or numerous, adnate to the corolla with free or connate filaments; anthers dehiscent laterally. *Ovary* more or less inferior, 2-5-celled; style filiform; stigma small, capitate, entire or obscurely 3-lobed; ovules pendulous or erect 1 or few on the inner angle of each cell. *Fruit* drupaceous, usually 1- (sometimes 2- 3-) seeded. *Seeds* albuminous; radicle as long or longer than cotyledons; embryo straight or curved.

(Engler in Das Pflanzen-reich has split this in 2 families—Symlococæ and Styraceæ.)

Stamens numerous in several rows.	..	1. Symlocos.
Stamens 10, uniseriate. Calyx free or slightly adnate to the ovary. Fruit ellipsoid or globose, seated on the cup-shaped calyx.	.. ..	2. Styrax.
Stamens 10. Calyx-tube adnate to the ovary. Fruit ellipsoid, wholly inferior.	.. ..	3. Parastyrax.

1. SYMPLOCOS Linn.

Trees or shrubs. *Leaves* alternate, simple, commonly turning yellowish when dry. *Flowers* hermaphrodite, regular, white or yellowish in axillary or terminal simple or compound racemes or spikes, sometimes reduced to a solitary flower; bracts solitary at the base of pedicels, early caducous; bracteoles 1-2 beneath the flower. *Calyx* superior, often enlarged in fruit; segments 5, imbricate. *Corolla* usually free or almost free (connate at base); lobes imbricate, 5 in one series or more in 2 series. *Stamens* usually numerous, several seriate, adnate to the corolla tube or the petals, often more or less distinctly pentadelphous; filaments filiform or flattened at the base; anthers short. *Ovary* inferior 3- (rarely 2- or 4-) celled; style usually filiform; stigma capitate, conspicuously lobed; ovules 2, pendulous from the inner angle of each cell. *Drupe* subglobose or ellipsoid crowned by the calyx segments, 1-3-seeded, stone woody. *Seeds* oblong; testa thin; albumen usually fleshy; embryo terete, straight or curved; cotyledon short.

Petals free or nearly so :—

Flowers in axillary fascicles. Leaves coriaceous. Calyx-rim nearly as wide as fruit. .. 1. *S. glomerata*.

Flowers in racemes :—

Flowers white or yellow :—

Leaves coriaceous :—

Fruit ovoid or cylindric less than 1 in. long, glabrous :—

Leaves more than 3 in. long.

Stamens about 100; petiole .25-.5 in.

long. 2. *S. racemosa*.

Leaves 2.5-4 in. Stamens 30-40.

Fruit ovoid; petiole .4-.7 in. long.

Racemes hirsute. .. 3. *S. Sumuntia*.

Leaves 2-4 in. Fruit more cylindric.

Petiole .9 in. long. Racemes

sparsely hairy or glabrous. .. 4. *S. pyrifolia*.

Leaves 6-9 in., ferruginous tomentose, beneath.

.. 5. *S. macrophylla*.

Leaves chartaceous :—

Racemes many flowered :—

Fruit ellipsoid or conical :—

Leaves 1.5-4 in., caudate acumin-

ate. 6. *S. caudata*.

- Leaves 3·5-7 in., obtuse or apiculate. 7. *S. ramosissima*.
- Fruit cylindric :—
- Leaves 5-7 in., almost entire.
Fruit ·5 in. long; stamens about 80. 8. *S. grandiflora*.
- Leaves 5-12 in., minutely toothed, membranous. Fruit ·6-·8 in. long, smooth. 9. *S. Hookeri*.
- Leaves 6-10 in., glandular-serrate, coriaceous. Fruit ·6 in. long, rusty pubescent. 10. *S. Pealii*.
- Spikes many flowered, hirsute :—
- Fruit globose. Stamens 18-25.
Fruit ·2 in. across. 11. *S. lancifolia*.
- Spikes many flowered, pubescent.
Fruit cylindrical, about ·1 in. across. 12. *S. khasiana*.
- Racemes or spikes compound :—
- Fruit globose or almost so :—
- Flowers pedicelled. Ovary 2-celled. 13. *S. cratægoides*.
- Flowers sessile :—
- Leaves glabrous. Fruit ·3 in. in diam. Ovary 3-celled. 14. *S. spicata*.
- Leaves rusty hairy beneath.
Fruit ·16 in. across. 15. *S. ferruginea*.
- Fruit cylindric, ellipsoid or conical :—
- Stamens 10-25. Lateral nerves 5-8. Embryo curved. 16. *S. oxyphylla*.
- Stamens many. Lateral nerves numerous, rather inconspicuous.
Embryo straight. 17. *S. theæfolia*.

1. *Symplocos glomerata* King. ex Gamble. Vern. *Kynja-dieng-pic*, *Tew-dieng-pei-iong*, Khasi.

A shrub or a small tree (25'/15"). *Bark* blackish grey, plain; blaze white. *Leaves* 3-8 by 1-2 in., narrow-lanceolate, acuminate, glandular, serrate, coriaceous, glabrous and shining on both surfaces, veins sunk above, conspicuous beneath; lateral nerves slender, about 12 on either half, joined by an intramarginal nerve; base tapering, cuneate; petiole ·2-·7 in. long, often glandular. *Flowers* yellowish, crowded in dense axillary fascicles; bracts ovate. *Calyx* rusty woolly outside; segments rotundate. *Corolla* twice the length of calyx;

stamens 25, twice the length of corolla. *Fruit* up to .5 in., cylindric, obscurely 3-gonous, 1-seeded with calyx rim as wide as the drupe; embryo straight.

SIBSAGAR, K. & J. HILLS.

Flrs. 4-5. Fr. 7-8.

2. *Symplocos racemosa* Roxb.

A small tree with broad crown (50'/24''). *Bark* brownish-grey, rough; inside greenish white and brown mottled, fibrous, somewhat granular, .5 in. thick. *Leaves* 3.5-6 by 1.2-5 in., oblong-elliptic or elliptic-lanceolate, serrulate, obscurely crenate or entire, acute, obtuse, acuminate, coriaceous, glossy glabrous, dark-green above; midrib slightly pilose; lateral nerves slender, inconspicuous, 5-8 on either half, obliquely curved; base cuneate or obtuse; petiole .25-.5 in. *Flowers* white, turning yellowish, .3-.5 in. across, in axillary pubescent, simple or compound racemes, each flower supported by 3 pubescent bracts, one at the base of the pedicel and 2 below the calyx; pedicels .05-.15 in. *Calyx*-tube glabrous; segments oblong, ovate, puberulous. *Corolla* lobes obtuse, oval. *Stamens* numerous, unequal; anthers as broad as long with a very small connective. *Disc* epigynous, minutely pilose. *Drupe* 3-celled, oblong, glabrous, purplish-black when ripe, crowned by the persistent calyx; embryo straight.

SIBSAGAR, SYLHET, GOALPARA, K. & J. HILLS.

Flrs. 10-12. Fr. 1-5.

3. *Symplocos Sumuntia* Ham.

A small tree. *Branchlets* terete, rather stout. *Leaves* 2.5-4 by 1-2 in., elliptic or oblong, bluntly acuminate, entire or irregularly dentate, coriaceous, glabrous; lateral nerves about 8 on either half, oblique, fairly straight; base cuneate; petiole .4-.7 in. long, flattened above. *Flowers* sweet scented in axillary solitary few flowered racemes 1-2 in. long; rachis zigzag; buds ovoid; pedicels short, stout, rather elongated in fruit. *Calyx* segments about .5 in. long, broadly deltoid, blunt, shorter than the tube. *Corolla* white; lobes about .12 in. long, broadly ovate. *Stamens* 35-40, 5-adel-

phous. *Fruit* sublobose, about .15 in. long; embryo straight.

KASHI HILLS, (Barpani)—Hooker.

Var. floribunda *Wall.*—Has larger and more densely set flowers which are very sweet scented, shorter racemes. *Calyx* lobes glabrous, tinged reddish. *Stamens* 5-adelphous.

KHASI HILLS (Shillong, Short Round).

Flrs. 3. Fr. Rainy season.

4. Symplocos pyrifolia *Wall.* Vern. *Dieng-mar khoit*, *Dieng-soh-rishang*, *Dieng-pe-lih*, *Dieng-pei-synrang*, *Dieng-ja-peh*, Khasi.

A small tree or shrub (25'/18"). *Bark* grey, .25 in. thick, rough; blaze white mottled with brown. *Wood* cream-coloured. *Leaves* rigid, 2-4 by .8-1.5 in., elliptic-lanceolate, acuminate, sub-entire or sparingly and distantly dentate, shining, entirely glabrous; lateral nerves about 6 on either half, impressed above, prominent beneath; petiole up to .9 in. long. *Flowers* dull white, faintly scented (very like myrtle) in axillary finely pubescent racemes 1-1.5 in. long. *Calyx-limb* not produced beyond ovary; segments brown, strigose outside. *Corolla* sparingly silky hairy outside. *Stamens* numerous; filaments very slender, longer than the corolla lobes. *Disc* conspicuous. *Fruit* ellipsoid, .5 by .16 in., 1-3-seeded. *Seeds* cylindrical, somewhat oblique.

KHASI HILLS up to 5,000 ft.

Flrs. 10-11. Fr. 4-5.

5. Symplocos macrophylla *Wall.*

A small tree; branchlets densely ferruginous-tomentose. *Leaves* 6-9 by 2.5-4 in., elliptic or obovate-oblong, shortly acuminate, wavy at the margins, sub-coriaceous, shining above, ferruginous-tomentose beneath, especially along the nerves; lateral nerves about 12 on either half, arched, depressed above, prominent beneath; base rounded; petiole .5-.7 in. long, stout, densely ferruginous-tomentose. *Spikes* 2 in. stout, densely rusty villous; bracts and bracteoles sub-similar, .2 in. long, ovate, very hairy. *Calyx* tube .06 in.

long, glabrescent; teeth .1 in. long, ovate, closely hairy. *Corolla* lobes .2 in., elliptic (Hooker).

(Flowers and fruit not seen).

(Only one specimen in Sibpur Herbarium without any flowers or fruit).

SYLHET (Wallich).

S. dryophila Clarke.

A tree; branchlets greyish, glabrous; young shoots slightly hairy; *Leaves* 3-5 by 1.2-1.7 in., oblong-elliptic or oblanceolate, entire-acuminate, coriaceous, glabrous; lateral nerves 8-12 on either half, faint; midrib depressed above, prominent beneath; base acute; petiole .6-.9 in. long. *Flowers* in axillary racemes, 5-6 in. long. *Calyx* about .2 in. long. *Fruit* globose, .2 in. across; embryo slightly curved (Brandis).

NAGA HILLS, Kohima

Flrs. Rainy season.

6. *Symplocos caudata* Wall. Vern. *Dieng-marangsnah*, Khasi.

An evergreen shrub or a tree (up to 42'/60") with an oval crown. *Bark* black, horizontally wrinkled; inside brownish yellow, granular; twigs dense. *Branchlets* dark purplish brown, smooth, coppices freely. *Leaves* 1.5-4 by .5-1.2 in., lanceolate or elliptic-lanceolate, caudate-acuminate, more or less serrulate, sub-entire, shortly coriaceous, midrib impressed above; lateral nerves inconspicuous, about 7 on either half; base cuneate; petiole .1-.3 in. long. *Flowers* white, (turning pale yellow) in axillary lax pubescent racemes, which are usually shorter than the leaves. *Calyx* glabrous; segments 5, ovate-oblong or ovate-lanceolate. *Corolla* lobes oblong. *Stamens* 25, exserted. *Ovary* glabrous. *Drupe* ellipsoid, .3 in. long (5-celled?—Kanjilal); embryo curved.

SIBSAGAR, K. & J. HILLS.

Flrs. 3-4. Fr. Cold season.

7. *Symplocos ramosissima* Wall.

A small tree or shrub. *Bark* dark brown, finely smooth; inside yellowish, tinged green. *Branchlets* glabrous. *Leaves* 3.5-7 by 1.1-.75 in., oblong-lanceolate, serrulate, acuminate, chartaceous; lateral nerves 6-9 on either half; base cuneate; petiole .25 in. long. *Flowers* whitish in lax axillary pedunc-

culate pubescent racemes; bracts ovate, pubescent; pedicels as long as calyx tube. *Calyx-tube* villous; segments hairy, rotundate. *Stamens* many. *Fruit* brownish, ellipsoid, .25-.3 in. long with a calyx rim narrower than the fruit.

KHASI HILLS.

Flrs. 6-7. Fr. 11-3.

8. *Symplocos grandiflora* Wall.

A tree (up to 60'/68"). *Bark* plain grey with white patches, .5 in. thick, red and uniform texture inside. *Leaves* 5-7 by 1.5-2 in., lanceolate, acuminate, subentire or distantly dentate, rigidly coriaceous, glabrous; midrib depressed above; lateral nerves 8-10 on either half, prominent beneath, subparallel; base usually cuneate. *Flowers* in long (up to 5.5 in.) racemes; bracts deciduous; pedicels .2 in. *Calyx* obconic, glabrous; segments 5, triangular-ovate. *Corolla* glabrous. *Stamens* numerous. *Fruit* .5 by .2 in., smooth, sub-cylindric.

Dafla Hills, SYLHET, KHASI HILLS.

Flrs. 12. Fr. 2.

9. *Symplocos Hookeri* Clarke.

Small tree. *Leaves* 5-12 by 2.5-4.5 in., oblanceolate or obovate-oblong, acute, minutely toothed, submembranous, glabrous, rather shining above; lateral nerves about 10 on either half, arched, very prominent beneath; tertiary parallel, transverse to the secondary; base cuneate; petiole 1-1.5 in. long. *Racemes* axillary; peduncles stout. *Calyx* segments rotundate, glabrous. *Corolla* not seen. *Fruit* .6-.8 by .3-.4 in. brownish, cylindric with a very hard stone; embryo straight.

(No specimen in Forest Herbarium).

KHASI HILLS (Nongklaw H. f. & T.).

Flrs. and Fr. 2-4.

10. *Symplocos pealii* King. ex. Das. nov. sp. Vern. *Thingjik*, Lushai; *Gahori Sapa*, Lakhimpur (wrongly?); *Naga tota*, *Mota-bhom-lati*, Sibsagar.

A small tree (30'/18") often a large tree. *Bark* greyish brown .12 in. thick, inside white (except the edges which

are reddish turning light-brown). *Wood* cream-coloured. *Leaves* 6-10 by 1·5-4 in. oblong, elliptic-oblong, glandular serrulate towards the apex, entire or sub-entire towards the base, obtuse or shortly acuminate, coriaceous, glabrous, paler beneath; lateral nerves 10-12 on either half, arcuate, prominent beneath; midrib impressed above, prominent beneath; base cuneate; petiole dark purplish, 1·25 in. long. *Flowers* reddish in tomentose cymose clusters or short spikes on old wood, axillary or extra-axillary; bracts about ·15 in. long, ovate or ovate-oblong. *Calyx* segments 5, ·1 ·12 in. long, ovate or ovate-oblate, tomentose without, glabrous within. *Corolla* lobes nearly free, oblong or elliptic-oblong, ·15·12 in. long. *Stamens* 40 or more in several series, unequal. *Ovary* half inferior; style glabrous. *Fruit* ·6 in. long, sub-cylindric, greenish brown, sparsely puberulous, shallowly veined.

LAKHIMPUR (Kanjilal's No. 6868, 3385), SIBSAGAR (Peal's No. 279,59) CACHAR (Kanjilal's No. 4744), Burma-Mytkyina Dist. (Parkinson's No. 2979).

Flrs. 6-11. Fr. 2.

11. *Symplocos lancifolia* Sieb. & Zucc.

A small tree. *Branchlets* almost glabrous. *Leaves* 2-4 by 1-2 in., lanceolate to ovate-lanceolate, acuminate, crenately serrulate or sub-entire, thinly coriaceous; base cuneate or rounded; petiole up to ·2 in. long. *Flowers* small in axillary slender pubescent spikes; bracteoles rusty-pubescent, imbricate. *Calyx* strigose; segments obtuse. *Corolla* up to ·16 in. long. *Stamens* 25. *Ovary* glabrous. *Fruit* globose, the shape of a pea about ·3 in. long, greenish black.

SIBSAGAR—Deroi Reserve.

Flrs. 10-11. Dry Fr. 10.

In Das Pflanzen-reich, Mez has separated *S. viridissima* Brand which is included under *S. lancifolia* in *F. B. I.* (iii), p. 577. *S. viridissima* is recorded from Patkoi mountain which has a much larger number of stamens 80-100 (Brandis) 40 (Mez).

12. *Symplocos khasiana* (Clarke) Brand. = *Symplocos racemosa* Roxb. Var. *khasiana* Clarke.

A small tree 25'/24". *Bark* corky, grey, split both vertically and horizontally, .5 in. thick; inside white, glabrous. *Leaves* 2-2.5 by 1-1.5 in., ovate-obtuse or apiculate, serrulate, glabrous; lateral nerves 5-7 on either half, cuneate or acute; petiole .4-.5 in. *Spikes* ferruginous-hirsute. *Flowers* sessile on spikes. *Calyx-tube* somewhat glabrous; segments hardly sericeous, tube not long. *Ovary* pilose. *Fruit* 3-celled.

KHASI HILLS (Griffith No. 3663). N. C. HILLS (U. Kanjilal No. 6772).

Fr. 1.

13. *Symplocos cratægoides* Ham. Vern. *Dieng-iong*, *Jam-iang*, *Dieng-iang*, Khasi; *Dieng-iang*, Synt.

A large shrub or a small tree (often reduced to more bushy undershrub in Khasi Hills owing to severe cold). *Bark* light grey, rough, corky, fibrous with deep reticulate furrows; blaze yellowish; young parts hairy. *Leaves* 1-4 by 1-2 in., broad, elliptic or ovate-acuminate or acute, sharply glandular serrulate, more so towards the apex, membranous, almost glabrous above, pilose or glabrescent beneath; lateral nerves 5-7 on either half, slender, ascending; tertiaries prominent, transverse, forming parallel pits; base cuneate or rounded; petiole .1-.3 in. long. *Flowers*, fragrant, yellowish-white, .2-.3 in. across in axillary or terminal corymbosely paniced cymes; bracts caducous; pedicels long, filiform. *Calyx-tube* obconic; segments ciliate. *Corolla* connate at the base; lobes 5, almost free. *Stamens* numerous; filaments connate at the base into 5 bundles adnate to the base of the corolla. *Ovary* 2-celled. *Fruit* .12-.3 in. long, obliquely ovoid or globose, crowned with the remain of the calyx segments, black when ripe, 1-seeded; embryo curved.

KHASI HILLS ascending up to 6000 ft.

The bark is considered a tonic. It is also used in ophthalmia. The leaves and bark give a yellow dye.

Flrs. 6-7. Fr. 7-10.

14. *Symplocos spicata* Roxb. Vern. *Dieng-ja-pei*, *Dieng-pei*, Khasi; *Dieng-lat-pe-rit*, Synt.; *Bhomlati*, *Bhom-rati*, *Bhoirati*, *Rotha*, *Konha*, *Bhoratmuni*, *Bhoira*, *Bhomera*, *Motabhomlati*; Ass.; *Ashila*, *Malabol*, Garo; *Sungkheng-bumphang*, *Sonkhimala*, *Boira*, *Mech*; *Bhumria*, *Raj-bongshi*.

A small tree (25'/24"). *Bark* greyish dark-brown, plain green underneath the cuticle, .25 in. thick; blaze cream-coloured to light brown, mottled with reticulating streaks of brownish coloured tissues. *Leaves* variable 2-6 by 1.2-5 in., lanceolate-elliptic, elliptic-lanceolate, obovate, crenate-serrulate or subentire, acute or bluntly acuminate, coriaceous (tough when dry), glabrous, shining above; lateral nerves 6-8 on either half; base acute; petiole up to .5 in. long. *Flowers* scented, cream-coloured or yellowish, fragrant in solitary or paniculate axillary pubescent or glabrous spikes; bracts and bracteoles ovate, pubescent. *Calyx* almost glabrous; segments 5, almost equalling the tube. *Corolla* divided almost to the base. *Stamens* numerous. *Ovary* 3-celled. *Fruit* globose, ribbed, about .3 in. across, surmounted by a short cylindric calyx-rim; embryo curved.

SIBSAGAR, LAKHIMPUR, DARRANG, KAMRUP, GOALPARA, GARO HILLS, KHASI HILLS—ascending up to 5,000 ft.

Decoction of the leaves is used in Indian medicine. Fruits are tied up in rosaries around the neck by Assamese.

Flrs. 9-10. Fr. 5-6.

15. *Symplocos ferruginea* Roxb. Vern. *Aslak*, Garo; *Garobhangra*, Ass. (Kamrup); *Sum-leg-arong*, Mik.; *Motabhomlati*, Ass.; *Dieng-lar-e*, *Dieng-lat-pe-soh-pangra*, Synt.

A medium sized or small evergreen tree (50'). *Bark* greyish-brown, about .2 in. thick; blaze cream-coloured, mottled with brown; branchlets rusty villous; leaf-buds ferruginous-tomentose; young shoots and leaves are red. *Leaves* 4-10 by 1.3-5 in., elliptic-lanceolate, serrulate towards the apex, subentire or serrate, coriaceous, glabrous above, rusty hairy beneath, specially on the nerves; midrib strong, depressed above; lateral nerves prominent beneath, 8-12 on

either half, subparallel; petiole rusty tomentose .2-.5 in. long. *Flowers* white, rather sessile in large compound rusty tomentose panicle; bracts ovate, rusty pubescent. *Calyx* rusty villous; segments 5, ovate. *Corolla* rotate; lobes 5, ovate. *Stamens* numerous. *Fruit* .16 in across, globose, ribbed, crowned by the enlarged calyx segments.

GOALPARA, GARO HILLS, KAMRUP, NOWGONG, N. C. HILLS, CACHAR, SIBSAGAR, LAKHIMPUR, MIKIR HILLS, K. & J. HILLS.

Fruits are used for rosaries.

Flrs. 11-2. Fr. 5-7.

16. *Symplocos oxyphylla* Wall. Vern. *Thing-tai-kan*, Kuki; *Dieng-eit-sim* (= birds' droppings), Khasi; *Bhomrati*, *Bhomlati*, Ass.; *Tappor-changne*, Duff.; *Tam-tingali*, Ass.; (Sibs.).

A large evergreen tree (70'/50''); stem somewhat fluted. *Bark* greenish-brown outside, peeling off in large flakes; blaze white; young leaves blackish purple. *Leaves* bafarious, 3-6 by 1.5-2.2 in., elliptic-lanceolate to oblong-lanceolate, sub-caudate-acuminate, sinuately serrulate, coriaceous, dark green, glabrous; lateral nerves 5-8 on either half, joined by intramarginal nerves; base attenuate to the petiole, which is .2-.5 in. long. *Flowers* small, shortly pedicellate in simple or compound racemes in the axils of the leaves or above the scars of fallen leaves; bracts minute, caducous. *Calyx* nearly glabrous; segments rotundate. *Corolla* large. *Fruit* .25-.4 in. long, conical, narrowed upwards into a cylindric beak; embryo curved.

CACHAR, GARO HILLS, KAMRUP, DARRANG, LAKHIMPUR, SIBSAGAR, N.-E. F. TRACT, KHASI HILLS, up to 4,000 ft.

Timber used for bridge constructions.

Flrs. 8-9. Fr. 2-3.

17. *Symplocos theæfolia* Ham. Vern. *Dieng-pet*, *Dieng-tew-pe*, Khasi; *Chikam*, Miri.

A middle sized or small evergreen tree (66'/50'') with dense and more or less horizontal branches; branchlets angular. *Bark* dark-brown with vertical lines of lenticellate

warts; inside very faint, brownish white with very fibrous distant broad streaks of white, .25 in. thick. *Leaves* 3-6 by 1-2 in., elliptic, elliptic-lanceolate, acuminate, sub-entire or shallowly serrulate, coriaceous, dark glossy green, quite glabrous, midrib raised on both surfaces; lateral nerves numerous, sub-parallel, rather inconspicuous; base cuneate; petiole up to .6 in. long. *Flowers* whitish, sessile, in short axillary panicles; bracts and bracteoles broad-oblique. *Calyx* glabrous; segments 5, rather short. *Corolla* lobes oblong. *Disc* densely covered with long white hairs. *Stamens* many. *Ovary* 3-celled. *Fruit* ellipsoid-ovoid, .25-.4 in. long; embryo straight.

LAKHIMPUR, DARRANG and KHASI HILLS (5,500 ft.).

Flrs. 11-12. Fr. 5-7.

2. STYRAX Linn.

Trees and shrubs, hairs often stellate. *Flowers* usually white in lax terminal or axillary racemes, occasionally subsolitary and axillary bracts small. *Calyx* campanulate, inferior or more or less perigynous, free or slightly adnate to the base of ovary, truncate or 5-4 toothed, persistent. *Corolla* tube short; lobes 5, imbricate in bud. *Stamens* 10, usually connate at the base and adnate to the corolla tube; filaments short; anthers large, linear. *Ovary* nearly free, incompletely 3-celled (1-celled above and 3-celled below), the dissepiments reaching to the middle; style subulate; stigma capitate; ovules few in each cell. *Fruit* globose or ellipsoid supported by the persistent calyx, chartaceous or coriaceous, breaking up irregularly, 1- or rarely 2- seeded; albumen copious; embryo straight; cotyledons flat or broad.

Branchlets stellately hairy. Inflorescence solitary or racemose :—

Accrescent calyx cupuliform in fruit.

Lateral nerves slender. Flowers small. .. 1. *S. serrulatum*.

Accrescent calyx deeply cleft in fruit.

Lateral nerves depressed above, raised

beneath. Flowers large. .. 2. *S. Hookeri*.

Branchlets glabrous. Inflorescence compound,

dichotomous. Style obscurely 3-fid. .. 3. *S. polyspermum*.

1. *Styrax serrulatum* Roxb. Vern. *Dieng-ja-lym-maw*, *Dieng-ja-lat-pai*, *Dieng-eit-blang* (=Goat's castings),

Synt.; *Bolnarang*, *Narang*, *Bolmisi*, *Borkhigrak*, Garo; *Phulkat*, *Bhakulipatol*, Ass.; *Dieng-soh-lapaiet*, *Dieng-soh-byklong*, Khasi; *Dungrabom-phang*, Mech.; *Paga-apug*, Miri and Abor; *Ragang-asing*, Abor; *Yagur-asing*, Miri; *Paye-changne*, Duff.; *Bonkhomotai-baphang*, Kach.

A small evergreen tree or shrub (up to 50'/36"). *Bark* bitter, blackish smooth, .3 in. thick; blaze yellowish mottled with brown granular streaks; wood cream coloured; young branchlets stellate-pubescent. *Leaves* 1.5-2.5 by .8-1.5 in., lanceolate, elliptic, ovate-elliptic or oblong, acuminate, serrulate, chartaceous, glabrous above, very occasionally setulose, stellate pubescent beneath, ultimately glabrescent; lateral nerves about 7 on either half, slender, venation reticulate; base acute or rounded; petiole .2 in. long. *Flowers* in axillary pedunculate fascicles or small racemes or subpaniculately racemed at the ends of branchlets. *Calyx* obscurely toothed or truncate, greyish tomentose. *Corolla* yellowish, 5-lobed; lobes oblong, obtuse, tomentose. *Stamens* yellow, 10; filaments inflexed over the ovary; anthers long, erect. *Ovary* hairy; ovules many. Fruit ellipsoid, .4 in. long, rusty-tomentose, 1-4-seeded, surrounded by the accrescent cupuliform calyx.

Var. *agrestis*.—Calyx-tube brown hirsute with spreading hairs.

Var. *virgatum*.—Leaves ovate, broadest below the middle and larger flowers.

N.-E. F. TRACT, LAKHIMPUR, SIBSAGAR, DARRANG, NOWGONG, KAMRUP, GOALPARA, GARO HILLS, CACHAR and K. & J. HILLS.

Flrs. 3-4. Fr. 10-12.

2. *Styrax Hookeri Clarke*.

A medium sized tree. *Leaves* 1.5-3 by .8-8.7 in., elliptic-ovate, elliptic, serrulate, more conspicuously towards the apex, thinly coriaceous, setulose on the nerves above, sparingly stellately hairy beneath, especially on the nerves; lateral nerves 5-7 on either half, depressed above, prominent beneath, arched; base rounded or subcordate; petiole .2-.3 in. long. *Flowers* yellowish, large, solitary (axillary or leaf opposed) or in small racemes at the ends of branchlets;

pedicels .25 in.; buds ellipsoid, .8 in. long. *Calyx* .25 in. across, funnel-shaped, rusty tomentose, usually sharply 5-toothed. *Corolla* 5-partite; tube .4 in. long; lobes short, imbricate in bud, membranous. *Stamens* 10; filaments partially free, stellate-tomentose. *Style* filiform, .8 in., densely stellate pubescent. *Fruit* subglobose or ovoid, .5 in. diameter.

K. & J. HILLS.

Flrs. 5. Fr. 10.

3. *Styrax polyspermum* Clarke.

A small tree. *Branches* glabrous. *Leaves* 3-6 by 1.2-5 in., lanceolate and oblong or elliptic, obscurely crenate, acute, thinly coriaceous, glabrous; lateral nerves about 10 on either half, much arched; base cuneate; petiole .3-.5 in. long, slender, flattened above. *Flowers* in terminal or axillary dichotomously branched compound cymes; buds ellipsoid, .12 in. *Calyx* densely silky tomentose outside; segments deltoid. *Corolla* densely silky outside; lobes oblong. *Stamens* 10, alternately longer. *Style* obscurely 3-fid. *Fruit* ellipsoid, pointed often with the remains of the style, about .3 in. long, imperfectly 3-celled; testa chartaceous (fruit unlike styrax may indicate a new genus—Hooker, Brandis).

KHASI HILLS, (Kurz., Mann, Griffith); N. C. HILLS above Jatinga (U. Kanjilal).

Flrs. 3-4. Fr. 5-6.

(Engler in Das Pflanzen-reich has omitted this from genus *Styrax*).

3. PARASTYRAX W. W. Smith.

Parastyrax Lacei W. W. Smith.

A lofty tree 150 ft. in height or over. *Branches* robust, longitudinally sulcate. *Leaves* 4-8-6 by 2-3 in., alternate, oblong or elliptic-oblong, shortly acuminate or acute, entire or subentire, coriaceous, glabrous above, minutely stellate-tomentose beneath; lateral nerves 5-8 on either half, subparallel, prominent beneath; base cuneate. *Flowers* yellow in simple or subpanicked racemes, axillary to the upper leaves; pedicel .1 in. long. *Calyx* cupular, short, .05 in.

long, adnate below to the inferior ovary and is prolong upwards into a narrow ring with a slightly irregular margin, not toothed. *Corolla* 5-partite; tube short; lobes imbricate, lanceolate, .33 by .17 in., minutely tomentose. *Stamens* 10; filaments united into a tube, glabrous outside, minutely pilose inside; free part of filament very short or 0. *Ovary* ovoid (immature) 3 locular, partly inferior; stigma subtrilobed. *Mature* fruit wholly inferior, ellipsoid, 1.2 by .4 in., covered with a fleshy exocarp and marked by elongate whitish lenticels; endocarp hard, woody.

N.-E. F. TRACT (3,000-4,700 ft.)—Rotung.
(Burkill's No. 36737, 37316 and 38190).

Flrs. 3.

FAM. 84. OLEACEÆ.

Trees or shrubs, erect or scandent, unarmed, rarely undershrubs. *Leaves* opposite, very rarely alternate, simple, trifoliolate or pinnate; petiole often articulated. *Flowers* hermaphrodite (rarely polygamous or diœcious) regular, 2-6-merous, sometimes poly or apetalous, in trichotomous terminal or axillary cymes or panicles. *Calyx* typically 4, inferior. *Corolla* lobes usually valvate or imbricate, rarely convolute, almost free in some species. *Stamens* 2, epipetalous; hypogynous in apetalous species; anthers dehiscing laterally or subextrorsely. *Ovary* inferior, 2-celled; stigma usually 2-lobed on simple style; ovules 1-2 in each cell, anatropous, attached to the inner angle near base or apex. *Fruit* drupaceous, capsular, baccate or dry schizocarp. *Seeds* 1 or 2, erect or pendulous; testa usually thin; albumen present or 0; embryo straight; radicle superior or inferior.

Corolla lobes much imbricate, radicle inferior :—

Seeds exalbuminous :—

Scandent shrub; fruit baccate. .. 1. *Jasminum*.

- Erect small tree; fruit a 2-valved compressed capsule. 2. **Nyctanthes.**
 Seeds albuminous; flowers in fascicles. .. 3. **Osmanthus.**
 Corolla lobes induplicate-valvate erect:—
 Leaves simple, penninerved; fruit a drupe, radicle superior:—
 Flowers in axillary panicles:—
 Corolla distinct, lobes connate or free in pairs. 4. **Linociera.**
 Corolla tubular or 0. 5. **Olea.**
 Flowers in terminal panicles, corolla funnel-shaped. 6. **Ligustrum.**
 Leaves pinnate; fruit samaroid-indehiscent; calyx minute. 7. **Fraxinus.**
 Leaves simple, conspicuously trinerved, a large twining shrub. 8. **Myxopyrum.**

1. JASMINUM Linn.

Shrubs, usually scandent, rarely undershrubs. *Leaves* opposite, rarely alternate, simple, 3-foliolate or imparipinnate; petiole usually articulated. *Flowers* mostly fragrant, usually handsome in terminal or axillary cymes, rarely solitary; bracts sometimes petaloid. *Calyx* tube funnel-shaped or campanulate; segments 4-9, usually linear or truncate. *Corolla* white, pinkish or yellow, salver-shaped; lobes 4-10 or more, spreading imbricate in bud. *Stamens* 2, usually included in the corolla tube; filaments very short; connective usually mucronate. *Ovary* 2-celled; style cylindric; stigma usually bifid; ovules 2 in each cell, basal. *Berry* didymous or simple by abortion, globose, ellipsoid or elongate. *Seeds* usually solitary in each carpel, erect, exalbuminous; testa thin; radicle inferior; cotyledons plano-convex.

Leaves opposite, simple:—

Calyx pubescent, segments twice the length of the tube or longer:—

- Calyx-segments .25-.3 in. long. Leaves ovate, even orbicular; lateral nerves about 3 on either half. 1. ***J. Sambac.***
 Calyx-segments .3-.5 in. long, filiform. Leaves ovate-lanceolate; lateral nerves about 3 on either half. 2. ***J. undulatum.***
 Calyx-segments .3-.7 in. long, hairy with yellow hairs. Leaves ovate; lateral nerves 3-4 on either half. 3. ***J. pubescens.***

Calyx-segments up to .5 in. long. Leaves elliptic to ovate-lanceolate; lateral nerves 4 on either half. 4. *J. coarctatum*.

Calyx-pubescent, segments less than twice the length of the tube:—

Corolla tube about 1 in. long. Petiole conspicuously articulated. Leaves coriaceous, almost glabrous, punctate on the under surface. 5. *J. scandens*.

Corolla tube .4-.6 in. long. Petiole channelled, often twisted. Leaves thinly coriaceous, glabrous. 6. *J. syringæfolium*.

Corolla tube .2 in. long, Calyx-segments faintly villous, .2 in. long, lateral nerves 4-5 on either half. 7. *J. Listeri*.

Calyx glabrous:—

Calyx-segments twice the length of the tube or more:—

Pair of basal nerves extending up to the apex of leaf and anastomosing with the secondary nerves. Cymes 1-5-flowered. 8. *J. anastomosans*.

Pair of basal nerves extending beyond half the length of the leaf, the pair often above the base. Cymes 3-flowered, sometimes solitary. 9. *J. subtriplinerve*.

Usually 3 nerved, basal pair sometimes not prominent. Cymes 3-5 flowered. .. 10. *J. laurifolium*.

Calyx-segments as long as or shorter than the tube:—

Lateral nerves 7-9 on either half. Corolla 1-1.4 in. 11. *J. glandulosum*.

Lateral nerves numerous obscure. Corolla .7-.8 in. Calyx hemispheric. 12. *J. attenuatum*.

Lateral nerves 7-9 on either half. Corolla .8 in. long. Calyx turbinate. .. 13. *J. subglandulosum*.

3 nerved:—

Corolla .7-.8 in. Calyx teeth linear-subulate. 14. *J. calycinum*.

Leaves opposite, trifoliolate:—

Leaflets subcoriaceous, glabrous; lateral nerves 6-7 on either half. 15. *J. flexile*.

Leaflets membranous with tufts of hairs on the nerves beneath; lateral nerves distinct about 8 on either half. 16. *J. caudatum*.

Leaflets thickly coriaceous, glabrous, minutely punctate. 17. *J. lanceolaria*.

Leaves opposite, imparipinnate. 18. *J. dispermum*.

Leaves alternate :—

Leaves 1-3 foliolate.	..	..	.. 19.	<i>J. heterophyllum.</i>
Leaves simple.	..	..	.. 20.	<i>J. Wengeri.</i>

1. *Jasminum Sambac* Ait. Vern. *Duamali*, Ass.

An evergreen shrub erect or somewhat climbing; young parts pubescent. *Leaves* simple, opposite, occasionally ternate, very variable, 1-3 by .5-2 in., usually ovate, even orbicular, finely acute or acuminate or obtuse, entire, membranous, glabrous above, pubescent beneath, specially along the nerves; lateral nerves slender, about 3 on either half; petiole up to .25 in. long, pubescent. *Flowers* white, very fragrant, about 1 in. across, axillary, solitary or in 3-flowered cymes; pedicels pubescent; bracts linear-pubescent. *Calyx* pubescent; segments 6-8 up to .3 in. long, linear, subulate. *Corolla* tube up to .7 in. long; lobes oblong. *Carpels* black when ripe, globose, surrounded by the enclosed calyx lobes.

KAMRUP, GOALPARA. Cultivated for the exquisitely fragrant flowers which are generally double in cultivation.

Flrs. 3-6. Fr. Rainy season.

2. *Jasminum undulatum* Ker. Vern. *Salika-kund*, Darrang; *Injuri-apun-riube*, N.-E. F.

Scandent shrub. *Branchlets* pubescent; stem succulent. *Leaves* bifarious, 1.5-2.5 by .6-1 in., ovate-lanceolate, acute or acuminate, entire, membranous, almost glabrous above with the exception of the midrib which is hairy, glabrescent beneath except the nerves which are more or less pubescent; lateral nerves about 3 (not conspicuous) on either half; base rounded or subcordate; petiole up to .25 in. long. *Flowers* white, slightly scented in capitate cymes, usually slender on pilose lateral branchlets. *Calyx* segments .3-.4 in. long, filiform, sparsely pubescent. *Corolla* tube 1 in. long, slender; lobes ovate-acute or acuminate. *Carpels* 1-2-lobed, blackish when ripe, enclosed in the pubescent calyx segments.

N.-E. F., SIBSAGAR, KHASI HILLS.

Flrs. 9-10. Fr. 1-3.

3. *Jasminum pubescens* Willd. Vern. *Hinjari-riube*, Abor; *Batguamani*, *Kharhika-jai*, *Duamali*, Ass.

A scandent shrub; young parts villous. *Leaves* opposite, simple, 1-3 by .7-1.75 in., ovate-acuminate, entire, more or less pubescent beneath; lateral nerves 3-4 on either half; base rounded, cordate or rarely slightly cuneate; petiole .2-.4 in. long, pubescent. *Flowers* white, fragrant subsessile in short pedunculate cymes. *Calyx-segments* .3-.7 in., linear, hairy, nearly as long as the corolla tube. *Corolla* tube .6-.7 in. long; lobes oblong-lanceolate, shorter than the tube. *Fruit* of 1 or 2 carpels, globose or elliptic, surrounded by the calyx teeth, black when ripe.

N.E. FRONTIER TRACT, LAKHIMPUR, SIBSAGAR, KHASI & JAINTIA HILLS.

Juice of root is considered infallible for snake-bites both internally and externally.

Flrs. 10-4, (often throughout the year). Fr. end of rains.

4. *Jasminum coarctatum* Roxb. Vern. *Kharikalata*, Ass., (N. Lakhimpur).

A large woody climber. *Bark* brown, striate, green below the cuticle. *Leaves* variable, 1-6.5 by .6-2.5 in., simple, opposite, elliptic, ovate to oblong-lanceolate, entire, shortly acuminate, membranous, almost glabrous, shining, sometimes pilose on the midrib above and with tufts of hairs at the nerve axils beneath; lateral nerves about 4 on either half, arched; base occasionally subcordate, rounded or oblong; petiole up to .5 in. long, articulated. *Flowers* about 1 in. across, white, fragrant in terminal capitate rusty pubescent congested cymes supported by foliaceous petaloid puberulous bracts (up to 1 in. long). *Calyx segments* up to .5 in. long, pubescent. *Corolla* tube 1.25 in. long, slender; lobes 6-8, oblong-lanceolate, pointed. *Carpels* ellipsoid, .5 by .3 in.

N.E. F. TRACTS, KAMRUP, LAKHIMPUR, SIBSAGAR, GOALPARA, LUSHAI HILLS, KHASI HILLS, ascending up to 4000 ft.

Flrs. 4-6. Fr. Rainy season.

5. *Jasminum scandens* Vahl. Vern. *Mei-twe-lih*, Khasi.

A scandent shrub winding anti-clockwise, climbing by means of its recurved petiole, sometimes trailing on grass; branchlets pubescent. *Leaves* simple, .8.5 by .5.2.2 in., ovate to lanceolate, acuminate, entire, coriaceous, nearly glabrous, very minutely punctate on the undersurface also sparingly pubescent on the nerves beneath; lateral nerves 3 on either half, impressed above; base rounded; petiole up to .5 in., conspicuously articulated. *Flowers* white, tinged with red, fragrant in terminal compound 3-chotomous or subcapitate cymes, often on short axillary branchlets; pedicels short or 0. *Calyx* pubescent; tube turbinate, .1.15 in. long; segments usually 6, subulate, up to .2 in. long, recurved or curled. *Corolla* tube up to 1 in. long; lobes 6-8, .3 in., oblong-acute. *Carpels* usually 2, ellipsoid, .5.6 by .25 in.

SIBSAGAR, NOWGONG, SYLHET, GOALPARA, KAMRUP, GARO HILLS, KHASI & JAINTIA HILLS.

Flrs. 10-1. Fr. 2-5.

6. *Jasminum syringæfolium* Wall.

Climber. *Leaves* opposite, simple, 2.4 by 1.2 in., lanceolate to ovate, entire, finely acuminate, thinly coriaceous, glabrous; lateral nerves 3-4 on either half, (typically starting from near the base), much arched, very slender and inconspicuous above; base rounded; petiole .3.5 in., slender, channelled, often twisted. *Flowers* in terminal trichotomous cymes with slender branches and pedicels (which are pubescent). *Calyx teeth* linear, pubescent, about as long as the tube. *Corolla* tube .4.6 in.; lobes .3.4 in., oblong-ovate (or typically narrow-linear). *Carpels* ellipsoid.

(No specimen in Forest Herbarium.)
ASSAM (Brandis).

Flrs. 12.4. Fr. 3-5.

7. *Jasminum Listeri* King. *Mss.* in Calcutta Herbarium (No. 78).

Scandent shrub; branches pale-brown, glabrous. *Branchlets* faintly pubescent. *Leaves* opposite, .3-5 by 1.25 in., lanceolate-acuminate, glabrous, sparsely pubescent on nerves beneath; lateral nerves 4-5 on either half, prominent beneath. *Cymes* axillary, rather lax, capitate, pubescent, much shorter than the leaves; peduncle .3 in. long; pedicels .12 in. long. *Bracts* subulate, minute. *Calyx-tube* subulate, faintly villous, .2 in. long. *Corolla* white; tube .2 in. long; lobes .4 in. long. *Filaments* very short; anthers oblong, aristate. *Ovary* 2-celled; style cylindric, stigma bifid; lobes linear; ovules 2 in each cell.

LUSHAI HILLS-(Lungleh-A. T. Gage).

Flrs. 3-4.

8. *Jasminum anastomosans* Wall. Vern. *Kathmalibibbar*, Mech.; *Mei-lar-um*, Khasi.

A scandent shrub, winding anti-clockwise. *Bark* green. *Leaves* 1-4 by .5-1.5 in., elliptic-lanceolate to ovate-lanceolate, acuminate, entire, chartaceous, glabrous; a pair of basal nerves extending up to the apex and anastomosing with the secondary nerves; base rounded or subcordate; petiole up to .5 in. long, jointed. *Flowers* white in axillary 1-5 flowered cymes. *Calyx* segments usually 5-6, subulate, twice the length of the tube. *Corolla-tube* .75-1 in. long; lobes usually 7-10 by .5-.7 in., strap-shaped, acute. *Carpels* generally in pairs .7 by .35 in., ellipsoid.

Flrs. 4. Fr. 2.

GOALPARA, KHASI HILLS, LUSHAI HILLS.

Var. *silhetense* Blume.—Corolla-lobe half as long as the tube. This, in my opinion, should be considered as a form only.
KHASI & JAINTIA HILLS (U. Kanjilal's No. 6721).

9. *Jasminum subtriplinerve* Bl. Vern. *Bel-phulerlot*, Sylh.

A large climber. *Bark* green, rough, thin. *Leaves* variable, 1-6 by .5-2.3 in., ovate-elliptic, lanceolate, ovate-

lanceolate, shortly acuminate or sharply acute, entire, coriaceous, glabrous above, pubescent beneath, 3-nerved, the pair often above the base, midrib impressed above; base rounded or subcordate, often oblique; petiole up to .6 in. long, jointed. *Flower* white, fragrant, usually in axillary 3-flowered sessile cymes, sometimes solitary; buds reddish; bracts linear, .25 in.; pedicels short. *Calyx* reddish; segments usually 5, recurved, up to .3 in. long, occasionally sparingly pubescent. *Corolla-tube* 1 in. long; lobes 5-8, oblong, acute, up to .6 in. long. *Carpels* ellipsoid, .5 by .2 in.

MANIPUR, SYLHET, CACHAR, GOALPARA, SIBSAGAR, GARO HILLS, KHASI HILLS up to 5500 ft.

Flrs. 4-5. Fr. Cold season.

10. *Jasminum laurifolium* Roxb. Vern. *Kirkirilota*, Ass.; *Guti-mali*, Ass. (Kamrup).

A scandent shrub; stem succulent. *Branches* green, terete. *Leaves* bifarious, 1.5-5 by .5-1.2 in., elliptic-lanceolate to linear-lanceolate, long-acuminate (often blunt) entire, subcoriaceous, glabrous; usually 3 nerved, basal pair sometimes not very prominent; base rounded or obtuse; petiole up to .3 in. long. *Flowers* usually in 3-flowered terminal peduncled cymes; buds red. *Calyx* segments 5-7, filiform, usually spreading, .25 in. long. *Corolla* tube .6-.8 in. long, partially red; lobes 10-12, strap-shaped, acute, 1-1.25 in. long. *Carpels* 2.

LAKHIMPUR, KAMRUP, NAGA HILLS up to 1200 ft.

Flrs. 3-4. Fr. 7 or earlier.

Var. *sublinearis* F. B. I. Vern. *Bonkharikphullata*, Ass.—*Leaves* up to 7 in. *Calyx* segments .15 in. long.

LAKHIMPUR (U. Kanjilal's No. 4126).

Flrs. 4.

11. *Jasminum glandulosum* Wall.

Scandent shrub, branches closely lenticellate; bark corky. *Leaves* simple, opposite, 2.5-4 by 1-2 in., elliptic or ovate-lanceolate, acuminate, entire, membranous, glabrous; lateral nerves 5-7 on either half, much arched, generally

anastomosing away from the margin to form an intermarginal nerve with hairy glands at the axils; base generally rounded; petiole .3 in. long. *Flowers* solitary and axillary or in few flowered trichotomous, corymbosely branched terminal cymes; pedicels bracteolate about the middle, .2-1 in. long, slender. *Calyx-tube* about .25 in. long, often ribbed; teeth very short, but often sharp. *Corolla* tube 1-1.4 in. long, very slender; lobes linear, spreading. *Carpels* 1 or 2, unequal if 2, ellipsoid, .75 by .3 in., greenish purple.

KHASI HILLS (Railiang, U. Kanjilal, Shillong C. B. Clarke).

Flrs. 7-8. Fr. 1-2.

12. *Jasminum attenuatum* Roxb.

Scandent shrub. *Leaves* 3-6.5 by 1-2 in., oblong, acuminate, entire, rather thinly coriaceous, glabrous; midrib prominent beneath, channelled above; lateral nerves numerous, obscure; base rounded; petiole .2-.7 in., slender. *Cymes* axillary, few flowered; pedicels very slender, .3-.5 in.; buds oblanceolate. *Calyx* .08 in. across, hemispheric, teeth minute, sharply pointed. *Corolla* .7-.8 in. long; lobes .3 in. long, ovate; tube trumpet-shaped. *Carpels* .3-.4 in. long, ellipsoid, unsymmetrically lobed.

MANIPUR, KHASI HILLS, NAGA HILLS, SYLHET, N.E. F. TRACT. (up to 6000 ft.). No specimen in Forest Herbarium, Shillong.

Fls. 3-4. Fr. Probably rainy season.

13. *Jasminum subglandulosum* Kurz.

A scandent shrub. *Bark* thick, corky. *Leaves* 4-8.5 by 1.5-3 in., ovate-oblong, rather bluntly acuminate, entire, thinly coriaceous; lateral nerves prominent, 7-9 on either half; base rounded; petiole .2-.8 in. *Flowers* in lax pedunculate racemes; pedicels slender, 1-1 in.; bracts minute, subulate, pubescent. *Calyx-tube* turbinate, .15 in. long; teeth broad, short. *Corolla* tube up to .75 in., slender; lobes about .3 in. long, strap-shaped, blunt. *Carpels* 1 or 2, .55 by .3 in., ellipsoid.

GOALPARA, SIBSAGAR, KHASI HILLS.

Flrs. 9. Fr. 1-2.

14. *Jasminum calycinum* Wall.

A scandent ramous shrub. *Leaves* opposite, $\cdot 7\cdot 2\cdot 2$ by $\cdot 6\cdot \cdot 8$ in., elliptic-ovate, acuminate, glabrous on both the sides, 3-nerved; nerves prominent underneath, impressed on the ventral surface; base obtuse, rounded; petiole $\cdot 15\cdot \cdot 20$ in. long. *Flowers* axillary or terminal, $\cdot 8\cdot 1\cdot 5$ in. long; pedicel $\cdot 2\cdot \cdot 6$ in. long, 1-2 in a cyme; bracts subulate, $\cdot 07$ in. long. *Calyx* with 6 linear-subulate teeth $\cdot 2\cdot \cdot 4$ in. long. *Corolla* tube $\cdot 7\cdot 8$ in. long; lobes linear-lanceolate, $\cdot 6$ by $\cdot 1$ in. *Stamens* 2, included in the corolla-tube; filaments very short; anthers conical with a broad base attached at the back near the base. *Ovary* elliptic, 2-celled; style cylindric. *Fruit* not seen.

KHASI HILLS.

15. *Jasminum flexile* Vahl.

A large climber. *Bark* whitish, stem obscurely striate. *Leaves* opposite, usually trifoliolate. *Leaflets* $1\cdot 5\cdot 4\cdot 5$ by $\cdot 5\cdot 2\cdot 3$ in., laterals narrower than the terminal, ovate-lanceolate or elliptic, acute or acuminate, entire, subcoriaceous, glabrous, dark-green and shining; lateral nerves 6-7 on either half with tufts of hairs in the axils beneath, base rounded or obtuse; petioles and petiolules channelled; petiolules $\cdot 2\cdot 1\cdot 2$ in. long. *Flowers* white, in lax slender pedunculate axillary and terminal paniculate cymes. *Calyx* teeth minute, acute. *Corolla* tube slender, $1\cdot 1\cdot 25$ in. long; lobes $\cdot 6$ by $\cdot 25$ in., oblong, minutely apiculate. *Stamens* inserted about $\cdot 3$ in. below the throat; anthers apiculate. *Style* exserted. *Carpel* $\cdot 3$ in. long, ellipsoid.

KHASI HILLS (U. Kanjilal's No. 6138).

Flrs. 10-12 Fr. 3.

Var. ovatum Wall.—Leaflets narrower; base cuneate. *Inflorescence* few flowered.

KHASI HILLS (U. Kanjalal's No. 2792).

Flrs. 10.

16. *Jasminum caudatum* Wall. Vern. *Mei-long-kait-sree*, *Mei-soh-siang*, Khasi.

A large woody climber; stem grey. *Bark* whitish; *Leaves* 3-foliolate; lateral leaflets usually smaller than the terminal. *Leaflets* 1-5 by .5-2.2 in., lanceolate or ovate-lanceolate, caudate-acuminate, obscurely undulate, membranous, glabrous with tufts of hairs on the nerve axils underneath; lateral nerves distinct, up to 8 on either half; base acute, rounded or obtuse; petiolule channelled up to .8 in. long; petiole up to 1 in. long.

Wood light yellow.

KHASI & JAINTIA HILLS.

Flrs. 8-12. Fr. 1-3.

17. *Jasminum lanceolaria* Roxb.

A large scandent shrub; stem obscurely ribbed; old stem covered with brownish-grey cork. *Leaves* opposite, usually 3-foliolate. *Leaflets* 2-5 by .5-2 in., elliptic, acuminate, entire, thickly coriaceous, glabrous, pale beneath, minutely punctate; lateral nerves obscure; base cuneate; petioles and petiolules channelled; petiolule .2-1.2 in. *Flowers* white, in axillary or terminal compound rigid pedunculate trichotomous cymes; pedicels thickened in fruit; bracts linear. *Calyx-tube* .15 in. long; teeth minute, triangular. *Corolla* large. *Carpels* 1-2, subglobose, .5 by .35 in., shining.

NAGA HILLS, KHASI HILLS up to 5000 ft.

Flrs. 4-5. Fr. 8-11.

18. *Jasminum dispernum* Wall. Vern. *Mei-tew-larmath-jongdi*, Khasi.

A glabrous scandent shrub twining anti-clockwise. *Leaves* opposite, imparipinnate, upper often 1-foliolate. *Leaflets* 3-5, terminal 3-4 by 1-1.8 in., lateral smaller, terminal cordate, lateral obliquely sub-cordate, lanceolate, acuminate, entire, coriaceous; rachis lanceolate, midrib and veins purplish-brown. *Flowers* fragrant, pinkish in few-flowered axillary cymes and many flowered elongated terminal panicles; pedicels up to .3 in. *Calyx* teeth .4 in.

long, triangular. *Corolla* tube .5-.7 in. long; lobes .2-.3 in. long, elliptic or ovate. *Carpels* ellipsoid, .5 in. long, purplish black when ripe.

KHASI & JAINTIA HILLS.

Flrs. 4-5. Fr. Cold season.

19. *Jasminum heterophyllum* Roxb.

A straggling shrub, rather erect, sometimes a small tree; branches lenticellate. *Leaves* alternate, 1-3-foliolate. *Leaflets* 1-5 by .8-2 in., ovate, ovate-lanceolate, caudate-acuminate, entire, coriaceous, glabrous; lateral nerves more or less conspicuous, impressed above; base usually rounded; petiolule .1-.7 in. long. *Flowers* bright yellow, fragrant in terminal compound corymbiform cymes. *Calyx* teeth minute. *Corolla* tube .3 in. long; lobes ovate or elliptic. *Carpels* 1-2, .3-.4 in. long.

MISHMI HILLS, NAGA HILLS, MANIPUR, KHASI HILLS up to 4,600 ft.

Flrs. 5. Fr. 10.

20. *Jasminum Wengeri* Fischer.

A climbing shrub. *Branchlets* terete, patently brown-hairy. *Leaves* 1.3-2.5 by .7-1.3 in., simple, ovate to ovate-lanceolate, attenuate, acute, margins more or less undulate, ciliate, brown-hairy on both surfaces, more densely so on the ribs and nerves; ribs 3-5, sub-palmate from the base with 2-3 pairs of nerves from the midrib, arching and anastomosing; base rounded or emarginate; petioles .15-.27 in. long, shaggy with brown-hairs. *Cymes* terminal and from the upper axils, trichotomous, compact, shorter than the leaves; peduncle short, densely brown-hairy. *Calyx* .19-.23 in. long, greenish tawny tomentose (dry); segments 5, linear-subacute, nearly as long as the tube, erect or nearly so, sinus narrow. *Corolla* tube slender, .6-2.12 in. long, slightly widening upwards, glabrous; lobes usually 6, narrowly elliptic, acute, .23-.31 in. long, glabrous. *Stamens* a little

below the throat of the corolla .07 in. long; anthers apiculate. *Fruit* not seen.

S. LUSHAI HILLS 3500 ft.—W. J. L. Wenger (1926).

Flrs. 8.

J. grandiflorum Linn. Vern. *Chameli* Beng., *Jati*, San., The *Spanish Jasmine*, Eng.

A large glabrous scandent or subscandent shrub; branches ribbed. *Leaves* opposite, imparipinnate; leaflets 7-11 in. *Flowers* exquisitely perfumed, white, tinged with pink, in terminal cymes. *Calyx* teeth longer than the tube, (.3 in. long,) linear, subulate. *Corolla* tube .6-.9 in. long; lobes 5, usually ovate. *Carpels* 2 (not seen).

KHASI HILLS, (Cultivated in Government Garden).

Flrs. 5-7. Fr. 8-11 (Flrs. & Fr. almost throughout the year).

J. dumicolum W. W. Smith.

A scandent shrub; branches slender. *Leaves* opposite, 6.2 by 1.75 in., narrowly lanceolate or oblong-lanceolate, cordate-acuminate, papery, glabrous; petiole .2 in., glabrous, channelled. *Inflorescence* axillary or terminal, cymose. *Calyx* campanulate, about .1 in. long; segments deltoid, acute. *Corolla* fragrant, white inside, deep rose, crimson outside; tube 1.5 in. long. *Stamens* sub-exserted. *Style* included. *Fruit* ellipsoid, about .4 in. long, blackish.

NAGA HILLS, MANIPUR.

Fr. 6.

2. NYCTANTHES Linn.

Nyctanthes Arbor-tristis Linn. Vern. *Sephalika*, Beng.

A small deciduous tree or bushy shrub. *Branchlets* rough pubescent, 4-angular. *Bark* rough, brown, greyish or greenish. *Leaves* 3-5.5 by 1.5-3 in., ovate, shortly acuminate, distantly toothed or entire, coriaceous, scabrid; lateral nerves 4-6 on either half; base rounded, cuneate or acute; petiole .2-.5 in. long. *Flowers* .5-.7 in. across, sweet scented, sessile, 3-7 together on hairy quadrangular peduncles of various lengths which are arranged in cymes or cymose panicles; bracts elliptical, pubescent. *Calyx* tube .2-.3 in., funnel-shaped, pubescent, obscurely 4-5-toothed. *Corolla* tube .3-.6 in., cylindrical, orange red; lobes white, 5-8, obcordate, contorted in bud. *Anthers* sub-sessile near the mouth of the corolla tube. *Ovary* 2-celled; style cylindric, shortly bifid; ovules 1 in each cell. *Capsule* .3-.5 in., orbicular, compressed, mucronate and often emarginate at the

apex, 2-celled; pericarp reticulate, leathery. *Seeds* roundish, compressed, exalbuminous.

Cultivated in ASSAM (GOALPARA, KAMRUP, L'AKHIMPUR).

Flowers usually come out in the evening and fall off in the next morning. *Flowers* are used in perfumery and the corolla tubes are used for dyeing. The juice of the leaves has various medicinal properties in Indian medicine used with other ingredients and are said to be efficacious for intestinal worms, fever, rheumatism and ascites.

Flrs. 8-10. Fr. 2-3.

4. OSMANTHUS Lour.

Osmanthus fragrans Lour.

A medium sized tree (up to 40'/60"). *Bark* plain, covered with horizontal lenticels when young, in maturity greyish or blackish-brown and rough outside with irregular depressions; inside hard and granular, reddish-brown, turning deep red on exposure, .25 in. thick. *Leaves* decussate, 3-7 by 1-7 in., lanceolate, oblong-acuminate, entire, coriaceous, glabrous; lateral nerves slender, more or less obscure about 12 on either half; base acute; petiole .5-.75 in. long, channelled. *Flowers* 4-merous, dioecious, very fragrant in axillary bracteate fascicles (of 5-7-flowers); pedicels filiform, lengthening out to .5-.6 in., as the flower expands. *Calyx* minute; segments shallowly deltoid. *Corolla* divided nearly to the base white, lobes imbricating in bud, oblong, .12 in. long, obtuse; tube very short. *Drupe* about .75 in. long, glaucous-blue (Brandis), dark purple when ripe containing a single ribbed stone (Osmaston).

Duffla Hills, KHASI & JAINTIA HILLS upto 7400 ft. (also cultivated or often shrubby).

Flrs. 10-11.

4. LINOCIERA Swartz.

Shrubs or trees. *Leaves* opposite, entire. *Flowers* in axillary or lateral, rarely terminal cymes or panicles, occasionally in small clusters; bracts small. *Calyx* small; segments 4. *Corolla* of 4 long or short lobes nearly free or connate, in pairs, induplicate valvate. *Stamens* 2; filaments short; anthers dehiscing marginally. *Ovary* 2-celled;

style short; stigma entire or obscurely 2-fid; ovules 2 in each cell, pendulous from the apex. *Drupe* globose, ellipsoid or oblong; endocarp bony or crustaceous. *Seed* usually solitary, pendulous; testa thin; albuminous or exalbuminous; radicle superior.

Petioles usually more than .5 in. long. Ovary glabrous; style short.

Petioles normally up to .5 in. long or less.

Ovary pilose; style as long as the ovary.

.. .. 1. *L. macrophylla*.

.. 2. *L. terniflora*.

1. *Linociera macrophylla* Wall. Vern. *Silong-asing*, Miri & Abor; *Pakikatar-asing*, N.-E. F. T.; *Thengogri*, *Theng-lokso*, *Thengouri*, Mik.; *Pareng*, Ass.; *Gangma-gobok*, *Selwal-chi*, *Athewatat*, Garo; *Silphoi*, Sylh.

A middle sized tree (60'/60"). *Bark* greyish or greyish-brown, warty, green underneath cork .16-.3 in. thick; blaze pale-yellow or pale-brown, mottled with brown streaks, turning darker-brown; with a resinous smell like mango. *Wood* white. *Leaves* 5-8 by 2-3 in., oblong to oblong-lanceolate, acute, rarely acuminate, occasionally obtuse, entire, coriaceous, glabrous, punctate on the upper surface; lateral nerves 6-13 on either half; base narrowed into the petiole; petiole up to 1 in. long. *Flowers* small, yellowish in densely flowered compound slender panicles (axillary or above the scars of fallen leaves). *Calyx* glabrous; segments ovate-acute. *Corolla* lobes velvety, fleshy, concave. *Ovary* glabrous; style short. *Fruit* ellipsoid, .7 by .3 in. on very much thickened pedicel.

Common throughout ASSAM (up to 5500 ft.).

Flrs. 3-4 Fr. 2-4.

2. *Linociera terniflora* Wall. Vern. *Komponesilong-asing*, N.-E. F. Tract.

A middle sized tree. *Bark* grey with horizontal wrinkles, thin pale inside. *Leaves* 2-4 by .1-1.75 in., elliptic to ovate-oblong, acuminate, sometimes blunt, entire, coriaceous, glaucous green; lateral nerves 8-9 on either half, impressed above, more conspicuous beneath; base narrowed into the petiole; petiole up to .5 in. long. *Flowers* small, white, in

pubescent divaricate paniced pedunculate heads which are usually 3-flowered. *Calyx* pubescent; segments ciliate. *Corolla* lobes connate in pairs. *Ovary* finely pilose; style twice as long as the ovary. *Drupe* .35 by .15 in., ellipsoid.

N.-E. F., SIBSAGAR, KHASI HILLS.

Flrs. 12-2. Fr. following cold season.

5. OLEA Linn.

Trees or shrubs. *Leaves* opposite, simple, entire or toothed. *Flowers* tetramerous, small, bisexual, diœcious or polygamous, axillary, extra-axillary or rarely in terminal panicles. *Calyx* toothed or truncate. *Corolla* tube short; lobes 4, induplicate-valvate or 0. *Stamens* 2, epipetalous and exserted or sub-hypogynous; filaments short. *Stigma* capitate or bifid; ovules 2 in each cell. *Drupe* ellipsoid or sub-globose; endocarp bony or crustaceous; exocarp fleshy. *Seeds* usually solitary, pendulous; albumen fleshy, radicle superior.

Female flowers without petals :—

Flowers whitish. 1. *O. dioica*.

All flowers with petals :—

Flowers yellowish. 2. *O. dentata*.

Fruit ovoid, small. *O. dentata*.

Fruit ellipsoid, .5 in. *Var. salicifolia*.

1. *Olea dioica* Roxb. Vern. *Poreng*, Ass.; *Bonbholuka*, Ass.; (Sibsagar); *Chapu*, Naga.

A middle sized tree (30'/20''), or a shrub. *Bark* greyish brown, warty having vertical fissures, sometimes peeling off in flakes; blaze brown, wood cream coloured, hard with a typical odour. *Leaves* very variable 1.5-7.5 by .5-3.2 in., usually elliptic-lanceolate, entire or serrate, acute or acuminate; lateral nerves 8-12 on either half, impressed above, prominent beneath, sub-parallel, arcuate; base cuneate; petiole .1-.5 in. long. *Flowers* small, white, diœcious in axillary or extra-axillary lax panicles with very slender branching. FEM. flowers.—*Calyx* 4 toothed; teeth triangular-acute. *Corolla* absent. MALE flowers.—*Corolla* deeply lobed;

lobes elliptic-obtuse. *Drupe* blue when ripe, ovoid, .4 by .3 in.

LAKHIMPUR, SIBSAGAR, DARRANG, KAMRUP, GOALPARA, GARO HILLS.

One of the species best suitable for fuel and charcoal.

Flrs. 3. Fr. 11.

2. *Olea dentata* Wall. Vern. *Thingcha*, Naga; *Reng-reng-arong*, Mik.

A tree (50'/72"). *Bark* dark grey, rough, .3 in. thick; inside fibrous, turning yellowish brown; young parts obscurely puberulous. *Leaves* 2.5 by .6-1.5 in., lanceolate, oblong-elliptic, bluntly acuminate, entire (Assam specimens), coriaceous, glabrous, midrib more or less impressed above; lateral nerves 9-10 on either half; base narrowed into the petiole; petiole .2-.5 in. long, obscurely channelled, puberulous. *Flowers* diœcious, small, yellowish, in axillary cymose puberulous panicles. *Calyx* minute; segments pubescent, *Corolla* campanulate; lobes 4, short. *Drupe* ovoid, glabrous.

N. C. HILLS.

Flrs. 3-6. Fr. Cold season.

Var. *salicifolia* Wall Vern. *Jongmi-kelok*, Mik.; *Dieng-sa-niriang-blai*, Synt.—A tree (60'/54'') with spreading crown; branches lenticelled, pubescent. *Bark* greyish brown, warty. *Leaves* 2.7 by .5-1.8 in., lanceolate, serrate or distantly denticulate. *Male flrs.* in axillary panicles exceeding the leaves. *Corolla* ovoid. *Female flrs.* axillary or extra-axillary or terminal. *Fruit* .6 in., ellipsoid, oblique.

N. C. HILLS, KHASI & JAINTIA HILLS.

Flrs. 10-11. Fr. 2.

6. LIGUSTRUM Linn.

Trees or shrubs. *Branchlets* often lenticellate. *Leaves* opposite, quite entire. *Flowers* bisexual, tetramerous, usually white in terminal often thyrsoid panicles, the lower nodes often with foliaceous bracts. *Calyx* small, truncate or toothed. *Corolla* funnel-shaped; lobes induplicate valvate. *Stamens* 2, adnate to the corolla tube; anthers oblong or

rounded, included or exserted. *Ovary* 2-celled; style rather long; stigma sub-clavate or thickened; ovules 2 in each cell, pendulous. *Drupe* 1-3-seeded; endocarp thin or chartaceous; testa thin; albumen fleshy; radicle superior.

Drupe longer than broad :—

Corolla tube nearly as long as the calyx.

Calyx campanulate, teeth minute; lateral nerves obscure beneath, 5-8 on either half.

Corolla tube slightly longer than the calyx.

Calyx truncate :—

Lateral nerves 9-12 on either half more or less distinct. Inflorescence usually pubescent.

Lateral nerves 8-10, irregular, slender on either half. Inflorescence usually glabrous.

Corolla tube twice as long as the calyx.

Calyx almost truncate; lateral nerves very few, not conspicuous.

1. *L. robustum*.

2. *L. compactum*.

3. *L. lucidum*.

4. *L. Massalongianum*.

Drupe globose :—

Leaves .8 in. long or smaller. Corolla tube extending the calyx; corolla lobes lanceolate-acute. Calyx tube obscure.

Leaves 4-5 in. long :—

Corolla tube extending the calyx; corolla lobes oblong, reflexed; bracts 0 or obscure.

Corolla lobes scarcely elliptic-oblong; bracts foliaceous, coriaceous.

5. *L. Myrsinites*.

6. *L. confusum*.

7. *L. nepalense*.

1. *Ligustrum robustum* Bl. Vern. *Bol-galde*, *Bol-geng-grak*, *Marakha-jathong*, Garo; (deer's leg). *Dieng-soh-lapalet*, *Dieng-soh-siang*, *Dieng-soh-pailet*, Khasi; *Dieng-shieng-kha*, Synt.; *Thengpi-kindu-arong*, Bengoi, Mik.; *Thekai-ching*, Naga; *Tukra*, *Takora*, Ass.; *Borkungli*, Nep.; *Dakra*, Miri.

A middle sized tree (40'/40'') or a large shrub. *Bark* greyish, slightly split vertically, .25 in. thick, rough; branchlets thickly lenticelled, spreading; blaze cream coloured with brown streaks. *Wood* cream coloured, hard. *Leaves* 2-farious, 1.5-5.5 by 1-2.5 in., elliptic, elliptic-lanceolate, ovate-lanceolate, narrowed at both ends, often acuminate (apex) entire, thinly chartaceous, glabrous glossy; lateral nerves irregular, obscure beneath, 5-8 on either half;

petiole .1-.5 in. long. *Flowers* small, .1 in. across, in pubescent or villous pyramidal panicles; bracts subulate. *Calyx* campanulate, teeth minute, 4. *Corolla* small, white; lobes spreadnig or reflexed. *Fruit* ellipsoid or cylindric, often slightly curved, .3-.5 in. long, purplish black, when ripe.

K. & J. HILLS up to 5,600 ft.

Flrs. 5-7. Fr. 12-4.

Var. khasiana (U. Kanjilal No. 5925). Erect rigid shrub with straggling branches. *Leaves* opposite, bifarious .8-4 by .4-1.5 in.; branchlets 4-angled, lenticellate. *Fruit* .25 by .2 in., erect, rugose. usually 1-celled, 1-seeded; albumen copious, white; cotyledons flat, orbicular; radicle cylindric, superior.

2. Ligustrum compactum Hook. f. & T. Vern *Parseru-thing*, Kuki.

A small tree. *Bark* ashy brown, smooth, stem somewhat fluted; branches more or less lenticellate. *Leaves* 2-5 by .7-1.5 in., elliptic-lanceolate or oblong-lanceolate, acuminate, entire, subcoriaceous, glabrous, shining above; lateral nerves 9-12 on either half, more or less distinct; base usually cuneate; petiole .2-.5 in. *Flowers* .2-.3 in. across, white, subsessile in thyrsoïd panicles. *Calyx* truncate. *Corolla* tube short, funnel-shaped; lobes oblong. *Fruit* numerous, .2-.3 in. long, ellipsoid, often slightly curved.

"Blaze rather fibrous, pale yellow, sometimes mottled with orange" (Osmaston).

N. C. HILLS, KHASI HILLS.

Wood white, moderately hard, close grained and durable.

Flrs. 6-7. Fr. Cold season.

3. Ligustrum lucidum Aiton. Vern. *Soh-pah-ie'*, *Dieng-soh-la-paiet*, *Dieng-soh-pai-it*, Khasi.

A small tree. *Bark* grey, corky, inside dull white with coarse strands of dark-brown, sometimes dirty chocolate brown. *Branchlets* closely lenticellate. *Leaves* 1.5-5 by .7-1.8 in., elliptic-lanceolate to ovate-lanceolate, acuminate, subcoriaceous, glabrous; lateral nerves 8-10 on either half, irregular, slender; base obtuse, often cuneate. *Flowers*

white, faintly scented, sessile in bracteate terminal, glabrous, panicles; bracts linear-lanceolate, caducous. *Calyx* tube .2 in. long, almost truncate or obscurely toothed. *Corolla* lobes oblong, rounded, .2 in. long. *Fruit* elongated, .3 in. long (immature).

KHASI HILLS up to 5000 ft.

Wood hard, used for agricultural implements.

Flrs. 6-8. Fr. 11.

4. *Ligustrum Massalongianum* Vis. Pl. Orto. Vern. Dieng-sha-kynriaw, Synt.

A small shrub often bushy and densely leafy; branchlets grey, warty, often with scattered lenticels. *Leaves* .1-2.5 by .2-.4 in., lanceolate or linear-lanceolate, entire, acute at both ends, subcoriaceous, glabrous, old leaves yellow; lateral nerves very few, not very conspicuous; petiole .1-.2 in. *Flowers* .15 in. across, subsessile, white in terminal minutely hairy panicles; bracteoles linear-minute. *Calyx* almost truncate, .05 in. long. *Corolla* tube .1-.13 in. long, slender; lobes 4. *Anthers* partly exserted. *Style* exserted; stigma clavate. *Fruit* erect, oblong, .4 by .16 in., minutely rugose, bluish purple when ripe.

GARO HILLS, KHASI HILLS, ascending up to 5000 ft.

Flrs. 4-6. Fr. Cold season.

5. *Ligustrum Myrsinites* Dcne. Vern. Diengphut-um, Khasi.

A small much branched rigid shrub; branchlets densely hairy. *Leaves* .4-.8 by .2-.5 in., elliptic, entire, blunt, coriaceous, glabrous; lateral nerves obscure; petiole up to .15 in. *Flowers* .15 in. across, small in terminal racemose cymes or in axillary few-flowered cymes. *Calyx* glabrous; teeth obscure, triangular. *Corolla* hypocrateriform; tube exceeding the calyx; lobes 4, lanceolate, acute. *Stigma* clavate. *Fruit* globose, small, .2 in. across.

KHASI HILLS ascending up to 6000 ft.

Flrs. 5. Fr. 9.

6. *Ligustrum confusum* Dcne. Vern. *Soh-lapiet-kynthei*, *Dieng-soh-phlang*, *Dieng-sit-nar*, Khasi, *Dieng-iang-dkhar*, Synt.

A middle sized tree; branchlets lenticellate; young shoots pubescent. *Bark* greyish, somewhat rough outside; blaze cream coloured, mottled with yellow. *Leaves* 6·5 by 3·2 in., lanceolate, elliptic-lanceolate to ovate-lanceolate, entire, sharply acute, subcoriaceous, dark-green, shining; lateral nerves 5-6 on either half, very slender; base acute or rounded; petiole 2-6 in. long. *Flowers* white in terminal pubescent panicles; bracts 0 or very minute. *Calyx* glabrous; teeth 4, broadly oblong, acute. *Corolla* tube slightly exceeding the calyx; lobes 4, oblong, reflexed, about as long as the tube. *Fruit* 2-celled, globose, 25 by 15 in., purplish black when ripe, rather obliquely set on the pedicels; cotyledons flat; radicle superior.

KHASI HILLS up to 5000 ft.

Flrs. 4-6. Fr. 12-1.

7. *Ligustrum nepalense* Wall.

A small tree or shrub; branchlets lenticelled; young shoots and inflorescence pubescent. *Leaves* 1·5-4 by 6-1·8 in., elliptic, elliptic-oblong or elliptic-lanceolate, acute or acuminate, entire, subcoriaceous, glabrous; lateral nerves 6-8 on either half, inconspicuous; base cuneate or rounded; petiole 1-5 in. *Flowers* white, subsessile or in terminal pyramidal bracteate panicles; bracts foliaceous, coriaceous, persistent, stalked; bracteoles oblong, minutely ciliate. *Calyx* campanulate, glabrous, obscurely and bluntly toothed; teeth blunt. *Corolla* tube scarcely exceeding the calyx; lobes 4, elliptic-oblong. *Drupe* globose, 2-3 in. long.

K. & J. HILLS ascending up to 6000 ft.

Flrs. 6-7 Fr. Cold season.

7. FRAXINUS Linn.

***Fraxinus floribunda* Wall.** Vern. *Dieng-la-maheg*, Khasi.

A large deciduous tree (50'/48"). *Bark* ash-grey, smooth in young trees, corky and somewhat rough and

warty in mature trees; inside hard, granular, yellow, mottled with brown fibres and grains, inner layers more fibrous, showing distinct concentric layers, outer granular, soon turning dark-brown, astringent. *Leaves* opposite, imparipinnate; rachis 5-8 in. long. *Leaflets* usually 7, opposite, 4-7 by 1·5-2 in., lanceolate-ovate or oblong-elliptic, caudate-acuminate, shallowly serrate, membranous, glabrous above, puberulous on the nerves beneath when young; lateral nerves 10-14 on either half, slender with reticulated secondary nerves; base cuneate, unequal sided; petiolules ·2-·5 in. long, channelled (Leaves yellow when old). *Flowers* about ·15 in., usually bisexual in large compound terminal panicles; pedicels filiform, fascicled on the branches. *Calyx* minute, 4-toothed; segments acute. *Corolla* lobes ·12 in. long, linear-oblong. *Stamens* near the base of the corolla tube; filaments about ·1 in. long. *Stigma* 2-fid. *Fruit* samaroid, oblanceolate, ·1 by ·5 in., compressed, supported by the enlarged calyx with 4-minute sharp pointed teeth; wing about ·7 by ·16 in., very finely veined, emarginate.

KHASI HILLS up to 5000 ft.

Flrs. Rainy season. Fr. Cold season.

8. MYXOPYRUM BL.

Myxopyrum smilacifolium Bl. M. Serrulatum A. W. Hill (in part). Vern. *Gohora-lata*, Ass.

A large evergreen scandent shrub. *Branches* 4-angular, glabrous. *Leaves* opposite, oblong to ovate, acuminate, entire, minutely toothed, coriaceous, 3-nerved or almost 5-nerved, veins reticulated; base cuneate or rounded, often unequal; petiole up to ·5 in. long. *Flowers* minute, yellowish in ample axillary or terminal trichotomous panicles. *Calyx* urceolate, sharply 4 segmented. *Corolla* lobes 4, concave, induplicate valvate in bud, tube longer than the calyx. *Stamens* 2 on the corolla tube; filaments short; anthers ovate, thick. *Ovary* 2-celled; stigma nearly sessile, 2-lobed; ovules 1-2 in each cell, attached near the base at the inner angle. *Fruit* ·3 in. across, 1-seeded, subglobose or 2-seeded, obovoid; pericarp crustaceous, purplish; albumen hairy; radicle inferior.

Mikir Hills, N.-E. FRONTIER TRACT, LAKHIMPUR, SIB-SAGAR, DARRANG, KAMRUP, GOALPARA, SYLHET, CACHAR. N. C. HILLS, GARO HILLS.

Flrs. 4-5. Fr. Cold season.

FAM. 85. APOCYNACEÆ.

Trees or shrubs, rarely herbs, often twining; latex present. *Leaves* simple, usually opposite, entire, rarely with small obscure stipule. *Flowers* regular, bisexual, 5- or 4-merous in axillary or terminal cymes, sometimes paniced; bracts small. *Calyx* inferior, often glandular within at the base; segments imbricate. *Corolla* usually slaver- or funnel-shaped, often hairy within; lobes spreading, usually contorted and twisted in bud. *Stamens* epipetalous, alternate with the corolla lobes; filaments short, included; anthers linear-oblong or sagittate, sometimes spurred, usually conniving over the stigma, sometimes adhering to the stigma by the produced connective. *Disc* usually present. *Ovary* 2-celled or usually of 2 more or less distinct carpels, united by the style; ovules 2-many, rarely solitary. *Fruit* usually of free or connate follicles, more rarely winged; albuminous or exalbuminous; embryo straight; cotyledons concave, convolute or contorted; radicle superior.

- I. Anthers included, free from the stigma; cells rounded at the base; seeds without coma or wing :—

Ovary 1-celled; placentas parietal :—

Fruit indehiscent (baccate). Corolla whitish or yellowish. 1. **Willoughbeia.**

Fruit capsular spinescent; corolla yellow. 2. **Allamanda.**

Ovary 2-celled :—

Climbing shrubs, unarmed; ovules many. 3. **Melodinus.**

Armed shrubs; ovules few. 4. **Carissa.**

Ovary of 2 distinct carpels adhering by the styles :—

Calyx glandular within; leaves whorled :—

Albumen ruminant; disc obsolete. 5. *Alyxia*.

Albumen uniform; disc cup-shaped. 6. *Rauwolfia*.

Calyx glandular within; '6-many ovuled; follicles 2 :—

Ovules biseriate :—

Seeds truncate :—

Leaves opposite; undershrubs. 7. *Vinca*.

Ovules many seriate :—

Seeds winged :—

Leaves alternate or scattered; shrub or tree. .. 8. *Plumeria*.

Seeds comose :—

Leaves whorled; seeds with tufts of hairs; large tree. .. 9. *Alstonia*.

Leaves opposite; small tree. .. 10. *Holarrhena*.

Seeds in an orange coloured aril :—

Leaves opposite. .. 11. *Tabernæmontana*.

II. Anthers conniving in a cone round the top of the style and adherent to the stigma by a point on the connective; cells produced downwards into empty spurs; ovary of 2 distinct carpels united by the style; follicles 2; seeds comose :—

Anthers more or less exserted :—

Corolla lobes valvate; filaments long. spirally twisted. .. 12. *Parsonsia*.

Corolla contorted; filaments short, not spirally twisted. .. 13. *Vallaris*.

Corolla salver-shaped, throat naked. 14. *Pottsia*.

Corolla rotate or salver-shaped with coronal scales. .. 15. *Wrightia*.

Anthers included :—

Corolla with scales (5-10) :—

Leaves whorled; corolla lobes not tailed; erect shrub. .. 16. *Nerium*.

Leaves opposite; corolla lobes tailed; twining shrub. .. 17. *Strophanthus*.

Corolla throat naked :—

Flowers small, corolla sub-camp-
anulate; lobes overlapping. .. 18. *Parameria*.

Flowers very large, (1.5-4 in. long).

Corolla lobes over lapping to the
right :—

Corolla campanulate or funnel-
shaped. .. 19. *Beaumontia*.

Corolla salver-shaped. .. 20. *Chonemorpha*.

Flowers very small; corolla lobes overlapping to the right; ovary exserted from the disc.; seeds beaked. 21. **Ecdysanthera.**

Flowers medium sized (.3-1.5 in. long):—

Corolla salver-shaped, lobes nearly straight or twisted to the left; seeds ovate-oblong. 22. **Aganosma.**

Corolla salver-shaped, lobes twisted to the left in bud, tips not deflected:—

Seeds beaked:—

Ovary exserted from the disc. 23. **Rhynchodia.**

Ovary hidden in the disc. 24. **Anodendron.**

Seeds not beaked; ovary exserted from the disc. .. 25. **Trachelospermum.**

Flowers small; corolla salver-shaped, sharply twisted to the left in bud, tips deflected:—

Seeds beaked. 26. **Ichnocarpus.**

Seeds not beaked. 27. **Micrechites.**

1. WILLOUGHBEIA Roxb.

Willoughbeia edulis Roxb. Vern. *Pabhoi-tenga*, Mech.; *Gedraphol*, *Laleng-tenga*, *Bel-tata*, Ass.; *Lalong-doukha*, Kach.; *Kenjet*, Mik.

An immense woody climber exuding milky juice. *Bark* dark-brown, somewhat warty; branchlets obscurely ribbed; tendrils long branched. *Leaves* 3-6 by 1.5-3.5 in., oblong or ovate-oblong, obtusely acuminate, slightly undulate, coriaceous, dark above, reddish-brown beneath; lateral nerves about 10 on either half, prominent (with many intermediate ones) anastomosing at the margin, midrib stout, raised below; base cuneate or rounded; petiole .2-.6 in. *Flowers* fragrant in axillary cymes; buds oblong, straight. *Calyx* 5-partite, eglandular, tube short, teeth shorter, ciliate. *Corolla* hypocrateriform, mouth naked: tube .2 in. long, rather swollen in the middle; lobes yellowish, cream coloured, narrow-oblong, .5 by .12 in., overlapping to the right, slightly ciliate along the veins or right margins. *Stamens* included; anthers subsagittate, cells rounded at the base. *Ovary* 1-celled, conical, acute; style short; stigma conical, puberulous. *Fruit* pyri-

from, many seeded, 2·3 by 1·5-2·25 in., red; many seeded, 2·3 by 1·5-2·25 in., red. *Seeds* somewhat flat, ·6 by ·3 in., exalbuminous.

LAKHIMPUR, SIBSAGAR, GOALPARA, NOWGONG.

Fruits are edible, pulp acid.

Flrs. 5. Fr. Cold season (12).

2. ALLAMANDA Linn.

Allamanda cathartica Linn.

An unarmed scandent shrub often suberect. *Leaves* whorled, mostly quaternate, oblanceolate, subsessile; lateral nerves strong, jointed by an intermarginal nerve; petiole with intrapetiolar glands. *Flowers* showy, yellow in axillary paniced cymes; branchlets subulate, ·15 in. long. *Calyx* 5-fid. *Corolla* 2 in. long; tube cylindrical, ·5 in. long; limb ventricose; lobes 5, rounded, throat hairy. *Anthers* 5, subsessile, adnate to the tip of the corolla tube with a tuft of white hairs at the base and a sharp (filamentary) hairy ridge below; style slender, white, glabrous, ·5-·6 in. long; stigma urn-shaped. *Ovary* 1-celled, placenta parietal; ovules many. *Fruit* spiny, size and shape of a *Datura*, 2-valved. *Seeds* flat, shallow, corrugated; albumen horny, cotyledons white, flat; radicle superior.

An American species, cultivated, GOALPARA (Kumguri).

Flrs. 4. Fr. Cold season.

3. MELODINUS Forst.

Evergreen erect or scandent shrub. *Leaves* opposite. *Flowers* 5-merous (rarely 4) white or pale-pink in terminal or axillary cymes. *Calyx* eglandular within. *Corolla* salver-shaped, tube cylindric, dilated, more or less opposite to the stamens, mouth with thick cleft or lobed scales, lobes overlapping to the left. *Anthers* included, sub-sessile, oblong-lanceolate, cells rounded at the base. *Disc* nil. *Ovary* 2-celled; style short; stigma thick, bifid; ovules many. *Fruit* a berry, pericarp coriaceous or hard. *Seeds* numerous, imbedded in pulp; albumen fleshy, cotyledons thin, foliaceous.

Flowers in terminal paniculate cymes :—

Leaves up to 6·5 by 2·5 in., chartaceous.

Flowers 1 in. long. Fruit about 3 in. diameter.

Leaves up to 5 by 1·5 in., membranous.

Flowers less than ·75 in. long. Fruit about 1·5 in. diameter.

1. *M. monogynus*.

2. *M. khasianus*.

1. *Melodinus monogynus* Roxb. Vern. *Soh-brab*, Khasi; *Jermei-sah-laroh*, *Tylli-siertuh*, Synt.

A large climber with milky juice, glabrous; branches smooth, brownish; old leaves yellow. *Leaves* 2-6·5 by ·5-2·5 in., elliptic-oblong or oblong-lanceolate, acuminate, margins obscurely recurved, chartaceous, glabrous; lateral nerves 15-20 on either half, slender; intermediate nerves numerous, often forked; reticulation transverse; base cuneate or rounded; petiole ·2-·4 in. long. *Flowers* white, fragrant in terminal trichotomously branched puberulous paniculate cymes. *Calyx-segments* ciliate, ovate-oblong, ·1-·15 in. long, *Corolla* tube ·5-·7 in. long, widening upwards, villous within, lobes up to ·5 in. long, oblong-obtuse, oblique, coronal scales villous 5, bifid at the apex. *Berry* globose, smooth, orange coloured, 3 in. across.

SIBSAGAR, NOWGONG, GOALPARA, KHASI & JAINTIA HILLS (4000 ft.).

Flrs. 4. Fr. 10-1.

2. *Melodinus khasianus* Hook. f. Vern. *Soh-brab-rit*, Khasi.

A climber. *Bark* grey, rough, thin; blaze cream coloured. *Leaves* 1·5-5 by ·5-1·5 in., narrow, lanceolate-acuminate, margins recurved, membranous, glabrous; lateral nerves about 19-22 on either half, slender with many intermediate nerves; reticulation transverse; base narrowed into a short petiole ·05-·3 in. long. *Flowers* white, turning yellowish in terminal cymes (Inflorescence much smaller than *M. monogynus*). *Calyx-segments* ·1 in. long, margins sparingly ciliate. *Corolla* tube ·2 in. long, slightly puberulous outside; lobes ·2 in. long, rounded, coronal scales villous at

the margins, deeply 2 cleft. *Berry* white, 1·5 in. across, ellipsoid.

SYLHET, KHASI HILLS (6000 ft.).

Flrs. 5-7. Fr. Cold season, persists long on the plant.

4. *CARISSA* Linn.

Carissa Carandas Linn. Vern. *Karenja*, Beng.

A large shrub armed with a pair of stout, sometimes branched, spreading spines up to 2 in. long. *Leaves* 1·3-3·3 in., oblong or elliptic-oblong, distinctly nerved. *Flowers* scented, ·5-·6 in. across, in sessile or peduncled corymbose cymes, cells of ovary with 4-ovules in each cell. *Berry* ellipsoid or globose, 4 or more seeded, ·5-1 in. long.

Cultivated for the fruits which are largely pickled or eaten raw. They are reputed to have antiscorbutic properties.

Flrs. 4-5. Fr. Cold season.

5. *ALYXIA* Br.

Shrubs, sometimes scandent. *Leaves* coriaceous in whorls of 3-4, rarely opposite, nerves obscure. *Flowers* small in axillary or terminal cymes. *Calyx* short, usually 5-partite, not glandular within. *Corolla* hypocrateriform, tube cylindric, throat naked, lobes 5, twisted, overlapping to the left. *Stamens* attached above the middle of the corolla tube; anthers lanceolate; base rounded. *Disc* absent or obscure. *Ovary* villous of 2 distinct carpels; style filiform; stigma oblong-lanceolate or capitate, pointed or bifid; ovules 2-6, biseriate in each carpel. *Fruit* of 1 or 2 drupes. *Drupes* 1-seeded or with 2 to one-seeded joints. *Seeds* ovoid or oblong, grooved or ventrally concave; albumen horny, ruminate; cotyledons thin; radicle superior.

Cymes long-peduncled, 2-4 in. long. *Leaves*

2-3·5 in. long. 1. *A. gracilis*.

Cymes short-peduncled, ·3-1 in. long. *Leaves*

3-6 in. long. 2. *A. fascicularis*.

1. *Alyxia gracilis* Benth.

A twining shrub, glabrous. *Leaves* opposite, 3 in a whorl, 1-2 by ·5-·7 in., elliptic-oblong or elliptic-lanceolate,

entire, bluntly acuminate, coriaceous, glabrous, shining above, pale beneath; lateral nerves quite obscure, midrib impressed above; base acute or cuneate; petiole $\cdot 1\text{--}2$ in. long. *Flowers* small in axillary slender branched long peduncled spreading, panicles 2-4 in. long; bracts small, ovate-acute. *Calyx* teeth $\cdot 06$ in. long, acute. *Corolla* $\cdot 12\text{--}16$ in. long; tube twice as long as the calyx; lobes oblong, obtuse, as long as the tube. *Carpels* drupaceous, ellipsoid, stipitate, $\cdot 75$ in. long, smooth.

(No specimen in Forest herbarium-Shillong).
SYLHET, KHASI HILLS (up to 4000 ft.).

2. *Alyxia fascicularis* Benth. Vern. *Tille-thang*, Synt.

A large woody climber almost glabrous. *Bark* greyish-white, lenticellate. *Leaves* ternate or opposite, $1\text{--}4\cdot 5$ by $\cdot 5\text{--}1\cdot 5$ in., elliptic-oblong or oblong-lanceolate, acuminate, coriaceous, glabrous, shining above; lateral nerves numerous, very slender, parallel; base narrowed into the petiole $\cdot 1\text{--}1\cdot 4$ in. long. *Cymes* $\cdot 75\text{--}1$ in., densely flowered; peduncles $\cdot 4$ in. long. *Calyx* $\cdot 25$ in. long; segments ovate, ciliolate, sparsely pubescent outside. *Corolla* $\cdot 2$ in. long, hairy within the tube. *Drupe* oblong-ovoid, usually 2 from the same flower. *Seeds* solitary or 1-4, superposed.

CACHAR, KHASI & JAINTIA HILLS (6000 ft.).

Flrs. 5. Fr. Cold season.

6. *RAUWOLFIA* Linn.

Shrubs or undershrubs, glabrous, rarely pubescent. *Leaves* 3-4-nately whorled, rarely opposite, axils glandular; nerves slender, usually arched. *Flowers* 5-merous in corymbose or umbellate cymes, alternate with the terminal leaves or axillary to the upper leaves. *Calyx* eglandular. *Corolla* tube cylindric, sometimes dilated opposite the stamens; the mouth constricted, the throat usually densely hairy within, lobes overlapping to the left. *Stamens* included; filaments short; anthers small, acute, cells rounded at base. *Disc* annular or cup-shaped. *Ovary* of 2 carpels distinct or connate; style filiform; stigma calyptriform at the base, tip

bifid; ovules 2 in each carpel, collateral. *Fruit* drupaceous, connate or distinct, usually 1-seeded. *Seeds* ovoid; testa thin; albumen fleshy; cotyledons flat; radicle superior.

An undershrub. Corolla tube slender dilated a little above the middle. Leaves usually in whorls of 3; lateral nerves up to 12. ..

1. *R. serpentina.*

A large shrub. Corolla tube slender, dilated below the middle. Leaves usually in whorls of 3-4; lateral nerves up to 20. ..

2. *R. densiflora.*

1. *Rauwolfia serpentina* Benth. Vern. *Arachontita*, Ass.; *Jowansu*, Mik.; *Birshi-wathi*, Kach.; *Karti*, Kuki; *Kharu-khu*, Mech.; *Todong-pait-parao*, Khasi.

An evergreen undershrub. *Bark* pale-brown. *Leaves* 2·7 by ·5-2 in., oblong-lanceolate or elliptic-lanceolate, acute or acuminate, rather membranous, glabrous, dark glossy green above, pale beneath; lateral nerves 8-12 on either half; base tapering; petiole ·1·3 in. long. *Flowers* white (tube usually pinkish) ·5·8 in. long, in long, pedunculate, terminal or axillary compact corymbose cymes; pedicels very short, bright scarlet; bracts minute, subulate, stout. *Calyx* glabrous; segments ·1 in. long, lanceolate, bright red. *Corolla* tube often curved, about ·3 in. long; lobes ·15 in. long. *Disc* large, cupular, slightly lobed. *Carpels* slightly connate. *Fruits* didymous or solitary, ·25 in. across, pointed smooth, black when ripe.

KAMRUP, NOWGONG, N. C. HILLS, GOALPARA, KHASI & JAINTIA HILLS, SYLHET, GARO HILLS (R. N. De).

The roots are said to be a reputed cure for snake-bite. Leaves and roots are used medicinally as febrifuge and tonic and as an anthelmintic and also in dysentery. It is reported to be a specific for insanity. (R. N. De).

Flrs 4-10. Fr. 7-1.

2. *Rauwolfia densiflora* Benth. Vern. *Dieng-la-tyrking*, *Dieng-soh-bu-blang* (tree with milk like goats'), *Dieng-la-tyr-kai*, *Dieng-ja-soh-korblang*, Khasi; *Dieng-lar-kei*, Synt.

A large shrub, sometimes a small tree; branches thick and covered with lenticels. *Bark* grey, corky. *Leaves* 5-10

by 1-3 in., oblanceolate or obovate-acuminate, subcoriaceous, glabrous, bright-green above, pale beneath; lateral nerves 10-20 on either half, arcuate; base cuneate; petiole .5-1 in. long. *Flowers* .3 in. long, white tinged with pink, in lax cymes; peduncles 3-4 in. long; pedicels slender; bracts minute. *Calyx* lobes slender, .16 in. long. *Corolla* tube almost .25 in. long; lobes elliptic-oblong. *Drupe*s very rugose, ellipsoid, solitary or in pairs, purplish black when fully ripe, supported by the persistent calyx. *Seeds* flat, tubercled.

KHASI & JAINTIA HILLS (1500 ft.).

Flrs. 6-9. Fr. Cold season.

Var. macrophylla.—A shrub about 6 ft. high. *Leaves* broader, very membranous. *Drupe* red.

SIBSAGAR.

R. chinensis Hemsl. (*Journ. Lin. Soc.* XXVI (1889-95) (*Ophioxylon chinense* Hance in *Journal of Botany* III (1865) 380).

A diffuse erect undershrub, nearly allied to *R. serpentina* Benth. *Bark* greenish-grey; lenticels whitish. *Leaves* 4-6.5 by .75-2 in., short petioled, opposite, entire, lanceolate, membranous, attenuate at both ends, glabrescent. *Cymes* axillary, solitary or 2-5 aggregate together. *Calyx* glabrous, partly greenish; segments triangular or subulate. *Corolla* white, glabrous outside, tomentose inside; lobes obtuse, tube shorter. *Drupe*s ovoid, blackish.

CHINA, SOUTH LUSHAI HILLS, ASSAM (Brandis).

7. VINCA Linn.

Vinca rosea Linn. Modern name *Lochnera rosea* (L.) Reichb.—A small evergreen under shrub. *Leaves* up to 2 in. long, obovate, oval or oblong, glossy. *Flowers* 1-1.5 in. across, white or deep rose in axillary pairs. *Follicles* single, slender, about 1 in. long.

A common garden plant.

Flowers almost throughout the year.

8. PLUMERIA Linn.

Plumeria acutifolia Poiret. Modern name *Plumeria acuminata* Aiton. Vern. *Gulaich*, *Gulachi*, Sylh.; *Gulanichi* or *Gunach*, Ass.; *Mir-kong-long-arong*, Mik.

A small soft wood tree. *Bark* corky fissured; branches herbaceous. *Leaves* 6-12 in. long, oblanceolate, fleshy with

an intramarginal nerve. *Flowers* .2 in. across, white, fragrant with yellow centre, purplish outside, in terminal peduncled cymes; bracts deciduous. *Calyx* 5-fid. *Corolla* salver-shaped, deciduous. *Anthers* obtuse. *Carpels* 2; ovules many serrate; stigma bilobed. *Fruit* of 2 linear-oblong follicle. *Seeds* winged.

Extensively cultivated throughout the province in gardens and near temples.

The bark, leaves, flower buds and latex are used medicinally in India.

Flrs. Hot season.

9. ALSTONIA Br.

***Alstonia scholaris* Brown.** Vern. *Bong-khlong*, *Bon-khlang-phang*, Kach.; *Sing-gar-asing*, Miri & Abor; *Souti-asing*, Miri; *Sotiana*, *Chhaiten*, Ass.; *Thengmu-arong*, *Thengpei-recho-arong*, Mik.; *Dieng-rytten*, *Dieng-ryteng*, Khasi; *Khami*, *Satni*, *Chhatni*, Sylh.; *Chong-pereng*, Kuki; *Letuang*, Tipp.; *Sethona*, Mech; *Sokson*, *Bor-chhak-chhan*, *Sokchuan*, Garo; *Satiana*, Jharua.

A tall evergreen tree; branches whorled, trunk buttressed or fluted. *Bark* grey with large horizontal lenticel-bar and light vertical fissures. *Leaves* in whorls of 4-7, 2-6 by 1-2.5 in., obovate, oblanceolate or elliptic-oblong, emarginate, rounded or bluntly acuminate, coriaceous, glabrous, shining above, pale beneath; lateral nerves numerous, parallel, terminating in an intramarginal nerve; base narrowed into the petiole, .25-.5 in. long. *Flowers* greenish-white in compact umbellately branched pubescent paniced cymes; bracts leafy; bracteoles minute; pedicels very short. *Calyx* small, 5-fid, pubescent; segments oblong, ciliate. *Corolla* .3-.5 in. across, pubescent outside, hairy within, constricted in the middle; lobes ovate-obtuse, spreading. *Stamens* included, attached to the middle of the corolla tube; anthers acute. *Ovary* villous of 2 distinct carpels; ovules many; stigma bifid. *Follicles* 2, slender, pendulous, terete, up to 2 ft. long and .2 in. in diameter. *Seeds* .3 in. long, flattened, oblong with tuft of brownish hair at either end.

Common throughout the province.

The wood is whitish, even grained, seasons badly. It is used for tea boxes, packing cases, etc. The bark is used as an astringent, anthelmintic, alterative and antiperiodic. It is efficacious in chronic diarrhœa and advanced stage of dysentery. The milk is applied to ulcers and mixed with oil in ear-ache. (*I. M. Plants*). The latex yields a kind of inferior crude caoutchouc.

Flrs. 2-4. Fr. 5-7.

10. HOLARRHENA Br.

Holarrhena antidysenterica Wall. Vern. *Bol-ma'ra*, *Mat-mande*, *Bolmigmu*, Garo; *Dudhkhuri*, Jharua; *Dudhkhuri*, *Dhutkhuri*, Ass.; *Theng-lokso*, *Bing-wai-pi-arong*, *Bengol-arong*, *Bengoy-the-arong*, Mik.; *Khirra*, Nep.; *Dieng-pang-knai*, *Diengpankanaisynrang*, *Dieng-lakhiet-dkhar*, *Dieng-jameu*, Kh.; *Kholoshi-phang-jola*, *Khiloshi-jalla-phang*, Kach.; *Leng-wom-theng*, Kuki.

A small deciduous tree (40'/46''); stems of large trees irregularly fluted. *Bark* soft, greyish-brown, rough, warty, having wrinkles about 2 in. apart, .3 in. thick; blaze brownish-yellow, faintly mottled brown, exuding latex; young parts pubescent. *Leaves* 3-10 by 1.5-4 in., elliptic or elliptic-oblong, acute or acuminate, coriaceous, glabrous or pubescent; lateral nerves 10-14 on either half; base obtuse or rounded; petiole up to .2 in. long. *Flowers* white, turning yellowish, .7-1.5 in. across, slightly fragrant, puberulous, in lax terminal corymbose cymes, which are 3-6 in. across; pedicels slender; bracts minute, lanceolate, pubescent. *Calyx* pubescent, deeply cleft; segments lanceolate, acuminate, glandular at base. *Corolla* salver-shaped; tube .5 in. long, slightly dilated at the base, hairy within; lobes oblong, twisted to the left in bud. *Anthers* subsessile, mucronate. *Carpels* 2, distinct; style short; stigma united; ovules numerous. *Follicles* 2, divaricate, 8-16 by .2-.4 in., slightly curved, usually dotted with white specks. *Seeds* .5 in. long, hairs silky about 1.5 in. long, light tawny.

Throughout the province, ascending up to 3,000 ft. The bark and seeds are valuable remedy for dysentery and are febrifuge and tonic. The wood is white, soft and even grained (wt. 40 lbs.) suitable for

carving. Lamp-stands and other household articles are made of the wood.

Flrs. 4-6. Fr. Cold season.

11. TABERNÆMONTANA Linn.

Tabernæmontana coronaria Br. Modern name *Ervatamea coronaria* (Jacq.) Stapf. Vern. *Themdaudi-phang*, *Sindur-buphang*, Kach.; *Mirnoda-arong*, *Miharai*, *Mir-herai*, *Mir-herel*, Mik.; *Dieng-ja-soh*, *Dieng-soh-sangaia*, *Dieng-soh-moien*, *Dieng-mad-lah*, *Kombat-sintew*, Khasi; *Kekep-asing*, Abor; *Hleng*, Lush.; *Naimitlien*, Tipp.; *Bonkhorsani*, Nep.; *Hindur goch*, *Kathmalati*, *Kathandaphul*, *Akhajiphul*, *Kothnaiphul*, Ass.

A handsome evergreen bushy shrub dichotomously branched. Bark greyish white, lenticellate; blaze greenish. Leaves 3-6 by 1-1·8 in.; elliptic-oblong, oblanceolate or oblong, acuminate or caudate, rather coriaceous, glabrous, shining, green above, pale beneath; lateral nerves slender, 5-6 on either half; base narrowed into the petiole ·25·5 in. long. Flowers pure white, 1-1·5 in. across, fragrant, in axillary or terminal lax corymbose cymes. Calyx-segments short, obtuse or rounded, glandular within. Corolla tube ·7-1 in. long, slightly dilated in the middle, throat glandular; lobes elliptic-oblong, obtuse, margin overlapping to the left, crumpled in bud. Stamens included; anthers subsessile, acuminate. Carpels 2, distinct; stigma bilobed. Follicles 1-3 by ·4 in., divaricate, sessile or shortly stipitate, 3 ribbed, somewhat fleshy, recurved, red or orange inside. Seeds enclosed in a red aril.

Common throughout the province, ascending up to 2,000 ft.; cultivated in gardens. In cultivation the flowers become double.

Flrs. 2-5. Fr. Cold season.

12. PARSONSIA Br.

Parsonsia spiralis Wall.

An evergreen twining shrub, glabrous; branchlets terete. Leaves 2-5 by ·7-3 in., elliptic, ovate-oblong or oblong-lanceolate, acuminate, rather coriaceous, glabrous; lateral

nerves slender, 4-8 on either half, arcuate; base cuneate, rounded or subcordate; petiole $\cdot 5\text{--}1\cdot 3$ in. long; interpetiolar stipular glands small, subulate. *Flowers* greenish or yellowish in axillary rather compact corymbose cymes, branching 3-chotomous. *Calyx-segments* ovate, thick, ciliate. *Corolla* tube cylindric, exceeding the calyx, glabrous, hairy at the throat with a red centre. *Filaments* twisted; anthers sagittate-lanceolate, conniving over and adhering to the stigma. *Carpels* 2, connate; stigma columnar; ovules numerous. *Fruit* of 2 connate follicles separating when fully ripe, 4-6 by $\cdot 7$ in. *Seeds* $\cdot 75$ in., coma pale golden brown.

SYLHET, KHASI HILLS, (5,500 ft.).

Flrs. 7-8. Fr. Autumn season, persist long on the plant.

13. VALLARIS Burm.

Vallaris Heynei Spreng. Modern name Valloria solanacea (Roth) O. Kze. Vern. *Mei-soh-sangia*, Khasi; *Kari-lewa*, *Jokhuni-lewa*, *Go-hingia* (cow's horn), *Gendheli-lata*, Ass.; *Kholosi-dukha*, Kach.; *Thang-rui-moi*, Kuki.

A large dextrose woody twining shrub; branches ashy grey, lenticellate. *Bark* on old stem brownish grey, warty, $\cdot 16$ in. thick; blaze brownish; exuding milky juice. *Leaves* $1\cdot 5\text{--}5$ by $\cdot 6\text{--}1\cdot 75$ in., opposite, distichous, oblong-lanceolate to elliptic, acuminate, rather membranous, almost glabrous; lateral nerves 6-9 on either half, very slender; base obtuse or acute; petiole $\cdot 2\text{--}\cdot 5$ in. long; stipules reduced to an intra-petiolar bristly ridge. *Flowers* $\cdot 5\text{--}\cdot 8$ in. across, white, scented in lax axillary usually dichotomous paniced pubescent cymes; bracts linear-lanceolate $\cdot 1\text{--}\cdot 2$ in. long; pedicels slender, $\cdot 2\text{--}\cdot 4$ in. long. *Calyx* 5-partite; segments pubescent, oblong-acute. *Corolla* salver-shaped, pubescent outside; tube short, $\cdot 1\text{--}\cdot 2$ in. long, hairy within; lobes ovate, rounded, overlapping to the right. *Filaments* dilated; anthers acute, hairy, connivent into a cone round the stigma and adnate to it, connective with a round gland on the back. *Disc* 5 fid; lobes obtuse, ciliate. *Ovary* of 2 connate carpels; style pubescent; stigma thick, conical; ovules many. *Follicles*

4-6 by 1-1·5 in., tapering from a broad base. *Seeds* beaked, ·5 in. long; coma silky white, ·7 in. long.

Common throughout the province, specially in the plains district.

Bark very bitter and astringent. Milky juice is a mild irritant and applied on wounds and sores causing inflammation and thereby expedites the process of healing. (Watt's Dictionary of E. P.).

Flrs. 1-4. Fr. Cold season.

V. assamica Griff. Vern. *Doukha-kaphuti*, Kach.—A climber spreading itself on tallest trees in dense shady forests. *Leaves* 1·5-3 by ·7-1·3 in. *Flowers* rather with a goatly smell. *Calyx* segments oblong-lanceolate, acute, rather exceeding the corolla tube. *Corolla* lobes greenish-white. *Stamens* at the mouth of corolla tube; anthers glabrous. *Disc* obsolete.

DARRANG, NOWGONG.

Flrs. 4.

14. POTTSIA Hook & Arn.

Pottsia cantonensis Hook. & Arn. Modern name *Pottsia laxiflora* (Bl.) O. Kze.

A large evergreen climbing shrub; young shoots brown pubescent. *Leaves* 2-3·5 by 1-2 in., ovate or elliptic-ovate, acuminate, membranous, glabrous above, sparsely pubescent along the midrib beneath; lateral nerves 5-6 on either half, subparallel, arcuate along the margin, tertiaries finely reticulated; base rounded or subcordate; petiole 1-4 in. long. *Flowers* pinkish, in axillary or terminal rusty puberulous drooping lax panicles; bracteoles small; pedicels slender, ·5 in. long. *Calyx* tube very short; segments ovate, glandular within. *Corolla* tubular, angled, deeply 5-lobed. *Anthers* sagittate, spurred, conniving over and adhering to the stigma. *Follicles* slender, 1 foot long, flexuous, smooth. *Seeds* 1 in. long, slender, black; coma 1-1·5 in. long.

KHASI HILLS, (4,000 ft.).

Flrs. 6. Fr. Cold season.

Thevetia nerifolia Juss. Yellow oleander. Modern name *Thevetia peruviana* (Pers.) Merr.

An evergreen shrub or small tree. *Leaves* 3-6 by ·5-4 in., linear, glossy-green, spirally arranged, margins recurved. *Flowers* yellow, fragrant, about 2 in. across in few flowered cymes. *Ovary* of 2, more

or less connate carpel. *Fruit* roundish, somewhat longitudinally constricted, fleshy; pericarp breaks into 2 when ripe; mesocarp woody, breaking into 2 valves.

A native of S. AMERICA. Cultivated for the flowers.

The latex is very poisonous.

15. WRIGHTIA Br.

Shrubs or trees. *Latex* white or yellowish. *Leaves* opposite. *Flowers* in terminal or subaxillary cymes. *Calyx* short, 5-partite with glands or scales within. *Corolla* salver-shaped; tube short, cylindrical with one or two seriate scales in the throat; lobes overlapping to the left. *Stamens* at the top of the corolla tube; filaments short, dilated; anthers sagittate, exserted, conniving in a cone round the stigma and adhering to it, cells spurred at the base. *Disc* 0. *Carpels* free or connate; ovules many; stigma ovoid, usually with a toothed basal ring. *Follicles* distinct or connate. *Seeds* linear, compressed with a deciduous coma at the base; albumen scanty or none; cotyledons broad, convolute; radicle short, superior.

Flowers greenish-white, turning yellow :—

Corolla tube as long or longer than the calyx segments. Leaves tomentose. Follicles 6-12 by .5 in., coronal scales orange-oblong, often lacinate or toothed. .. 1. *W. tomentosa*.

Flowers scarlet :—

Corolla tube shorter than the calyx segments. Leaves minutely white, pubescent along the nerves, otherwise glabrous. Follicles 6 by 1-1.5 in., coronal scales round, crimson, almost entire. .. 2. *W. coccinea*.

1. *Wrightia tomentosa* R. & S. Vern. *Bolmatra*, *Bol-golmatra*, *Bolmatma*, Garo; *Makta-dudhkduri*, Jharua; *Garo-dudkhuri*, or *Horu dudhkhuri*, *Dud-khori*, *Dudhgach*. Ass.; *Bongoi-arong*, *Bing waisu-arong*, *Bengoi*, *Bengol-arong*, *Mik.*; *Kholosiphang-jig*, *Kholosing*, *Kach.*; *Aleng*, *Kuki*; *Chota-khirra*, *Nep.*; *Dieng-panganai* or *pankanai*, *Khasi*; *Thou-khuri*, *Jolphol*, *Mech*; *Aleng-thing*, *Tipp*.

A small deciduous tree. *Bark* grey or greenish-brown rough corky, often warty, .25 in. thick; blaze whitish with green edges, turning yellowish after sometime, exuding a

sticky latex; extremities tomentose. *Leaves* distichous, 3-7 by 1.5-3 in., elliptic or elliptic-oblong, entire, sometimes obscurely serrulate, caudate-acuminate, rather membranous, velvety tomentose usually on both surfaces but always beneath; lateral nerves 8-16 on either half; base narrowed into the petiole, .2-.4 in. long with tufts of hairs on the axils. *Flowers* 1 in. across, white-greenish, turning yellowish creamy, not pleasantly scented, pubescent, in many flowered terminal corymbose cymes; pedicles slender, up to .3 in. long; bracts deciduous, linear-lanceolate, .5 by .1 in. *Calyx* tomentose; segments rounded, ciliate. *Corolla* tube about .25 in. long; coronal scales orange or red, toothed; lobes oblong, twisted to the left. *Fruit* 8-12 by .5-7 in. of 2-conate follicles united through the entire length, grooved at the junction of the carpels, verrucose with whitish lenticular dots. *Seeds* numerous, .5-.7 in. long, slender, apiculate; coma of white silky hairs, 1.2-2 in. long.

Common almost throughout the province.

The wood is yellowish creamy, moderately hard, close grained (weight about 40 lbs.) and is used for turnery and curving.

Flrs. 5-6. Fr. Cold season.

2. *Wrightia coccinea* Sims. Vern. *Tara-makpong-nasing*, Abor; *Pousit-asing*, Mīri; *Pong-khlung-baphang*, Kach.

A tree (60'/38"). *Bark* whitish grey outside, .2 in. thick, very light, greenish white inside with copious milky latex; glabrous or sparsely pubescent; branches lenticellate. *Leaves* 2-farious, drooping, 3.5-6.5 by 1.2 in., elliptic, elliptic-lanceolate or elliptic-oblong, caudate-acuminate, entire, membranous, minutely white pubescent along the nerves, otherwise glabrous; lateral nerves 7-9 on either half, subparallel, arching; base rounded or cuneate; petiole .05-.1 in. long. *Flowers* about 1 in. across, scarlet, in few flowered terminal cymes; bracts large. *Calyx-segments* rounded, .3 in. across. *Corolla* 1.5 in. across, coronal scale crimson, rounded, entire. *Follicle* 10-12 by 1.1-1.5 in., slightly flattened on the sides; lobe 2, shallow, furrows of the carpels are distinct, speckled with numerous elevated lenticels. *Seeds*

·65 in., compressed; tips naked; base with a caducous silky coma 1·6 in. long.

N.-E. F. TRACT, SIBSAGAR, NOWGONG, NAGA HILLS, SYLHET, CACHAR, KHASI & JAINTIA HILLS.

Flrs. 5. Fr. Cold season.

16. NERIUM Linn.

Nerium odorum Soland. Modern name *Nerium indicum* Mill. Sweet scented oleander. Vern. *Karabi*, *Rakta Karobi*, Beng.

An erect beautiful evergreen shrub. *Leaves* usually ternate, 2·6 by ·5·1 in., linear-lanceolate, tapering at both ends, coriaceous, glossy green above, paler beneath; nerves obscure, numerous, parallel. *Flowers* 1·5 in. across or more, fragrant, usually rosy, in terminal cymes. *Calyx* divided nearly to the base, segments transverse, about ·2 in. long. *Corolla* tube ·5·7 in., funnel-shaped, hairy within; coronal scales ·5 in.; lobes lacinate. *Stamens* at the top of the corolla tube; anthers sagittate, spurred, connivent into a cone and adhering to the stigma; connective produced into long thread-like hairy appendages, which are twisted together. *Ovary* of 2 distinct carpels; style dilated upwards; stigma sub-globose. *Follicles* connate, 6·8 by ·3·4 in., ridged, at length separating. *Seeds* linear, ·2 in. long, villous with a terminal coma of brownish hairs, ·5 in. long.

Shillong, (cultivated).

The plant is poisonous, specially the roots. The flowers are important adjuncts of certain Hindu rituals.

Flrs. 4·6. Fr. Cold season, (but most of the year in cultivation).

17. STROPHANTHUS DC.

Strophanthus Wallichii A.DC. Vern. *Mei-reng-bläng* (goats-horn creeper), Khasi.

A climber, turning clockwise, glabrous; branches stout, lenticelled. *Leaves* 2·5 by 1·1·8 in., elliptic or elliptic-oblong, entire, undulate or obovate, cuspidate or acuminate, membranous, glabrous, paler beneath, midrib impressed above; lateral nerves 6·8 on either half, arcuate, anastomosing into an inter-marginal nerve; tertiaries elegantly

reticulated; base cuneate or rounded; petiole slender, .1-.25 in. long; stipular glands interpetiolar. *Flowers* pale yellow or pinkish, purple veined in dichotomous cymes. *Calyx* glandular within; segments subulate. *Corolla* tube .75 in. long, constricted at the middle; lobes broad, twisted, caudate up to 2 in. long; coronal scales 10. *Anthers* sagittate, base spurred, produced in a long awn, connivent round the stigma and adhering to it. *Disc* 0. *Carpels* distinct; ovules many, many seriate; style slender. *Follicles* divaricate through an angle of 170°, green, glabrous, 4 by .6 in., very slightly curved inward. *Seeds* green, flattened, fusiform, narrowed into a plumose tail; coma silky white; cotyledons flat, oblong.

CACHAR, KHASI & JAINTIA HILLS.

Seeds of *Strophanthus hispidus* DC., furnishes the effectual drug strophanthin.

Flrs. 1-2. Fr. 10.

18. PARAMERIA Benth.

Evergreen climbing shrubs. *Leaves* opposite, rarely 3-nately whorled. *Flowers* small, in broad lax terminal or axillary panicles. *Calyx* small, 5-fid or partite, glandular at the base within. *Corolla* campanulate or hypocrateriform; tube short; mouth naked; lobes 5, oblique, twisted, overlapping to the left. *Stamens* attached to the base of the corolla, included; filaments short; anthers sagittate, acute or apiculate, connivent over and adhering to the stigma, cells spurred at the base. *Disc* of 5 connate scales. *Carpels* 2, distinct; ovules many; style short; stigma conical. *Follicle* distantly torulose. *Seeds* linear or oblong, compressed, crowned with short persistent ring of bristly hairs and a long deciduous coma; albumen scanty; cotyledons thin, leafy; radicle superior.

Leaves 1.5-3.5 by .8-2 in., lateral nerves 7-10 on either half, distinct; pedicels puberulous; anthers not apiculate; disc obscurely 5 lobed.

Leaves 1-2.5 by .5-.8 in., lateral nerves 4-6 on either half, obscure; pedicels glabrous; anthers apiculate.

1. *P. polyneura*.

2. *P. pedunculosa*.

1. *Parameria polyneura* Hk. f. Vern. *Mikirtengalata*, Ass.

A slender climbing shrub, extremities puberulous. *Leaves* 1·5-3·5 by ·8-2 in., elliptic, elliptic-oblong or obovate, abruptly acuminate or acute, membranous, glabrous, paler beneath, midrib and nerves impressed above, prominent beneath; lateral nerves 7-10 on either half; base acute or narrowed into the petiole, ·3-·5 in. long. *Flowers* ·15 in. long, small in terminal puberulous trichotomous paniculate cymes; pedicels short, puberulous, slender, ·15 in. long. *Calyx-segments* ·05 in. long, obscurely ciliate. *Corolla* lobes sparsely puberulous. *Anthers* not cohering at base, not apiculate. *Follicles* divaricate, slender, glabrous, 20-24 in. long. *Seeds* fusiform, 1-1·25 in. long, crowned by a silky coma 2 in. long.

DARRANG.

Flrs. 5. Fr. Rainy season.

2. *Parameria pedunculosa* Bth.

A slender climber. *Leaves* 1-2·5 by ·5-·8 in., elliptic, shortly acuminate, membranous, glabrous; lateral nerves 4-6, obscure; base acute or narrowed into the slightly decurrent petiole ·4-·7 in. long. *Flowers* pinkish outside, rosy inside in pedunculate glabrous paniculate cymes; pedicels ·15 in. long, glabrous. *Calyx-segments* acute, very small. *Corolla* campanulate; lobes ovate, acute, glabrous, spreading. *Anthers* almost cohering at the base, apiculate.

MANIPUR, N. C. HILLS.

Flrs. 5. Fr. Rainy season.

19. BEAUMONTIA Wall.

Very large climbing shrubs. *Leaves* opposite, nerves strong, arched. *Flowers* very large, white, in terminal cymes; bracts leafy. *Calyx* 5-partite, glandular or eglandular within; segments large, foliaceous. *Corolla* with short tubular base, campanulate or funnel-shaped, with large broad lobes overlapping to the right, throat naked. *Stamens* at the top of the tube, included; filaments long, thickened at the top;

anthers horny, sagittate, conniving round and adhering to the stigma, spurred at base. *Disc* deeply 5-lobbed. *Ovary* 2-celled; style filiform; stigma oblong, fusiform; ovules many. *Fruit* long, thick, woody, finally separating into 2 follicular mericarps. *Seeds* compressed, oblong or ovoid, attenuated at the apex and crowned by a coma; testa rugose; albumen thin, cotyledons foliaceous or thick; radicle short, superior.

Corolla 3-4 in. long; lobes shorter than the tube.	..	..	..	..	1.	<i>B. grandiflora.</i>
Corolla 2 in. long; lobes equalling the tube.	..	..	..	..	2.	<i>B. khasiana.</i>
Corolla 2.5 in. long; lobes shorter than the tube	..	..	..	..	3.	<i>B. longituba.</i>

1. *Beaumontia grandiflora* Wall.

A large stout woody climber, extremities rusty pubescent. *Leaves* 5-12 by 2-7 in., opposite, elliptic-oblong or ovate-oblong, abruptly acuminate, membranous, glabrous above, sparsely tomentose beneath; lateral nerves distant, 10-25 on either half, subparallel, arcuate; base acute, often oblique; petiole .5-1.5 in. long. *Flowers* white, very large, upto about 6 in. long in terminal cymes; bracts leafy; pedicels pubescent. *Calyx* 5-partite; segments foliaceous, 1-2 in. long. *Corolla* 3-4 in. long, almost glabrous, campanulate above; throat naked; lobes short, overlapping to the right. *Stamens* adnate to the tip of the tube, included; anthers linear, sagittate, connivent round and adnate to the stigma, spurred at the base. *Disc* deeply 5-lobed. *Carpels* 2, connate; ovules many; style filiform; stigma fusiform. *Fruit* thick, woody, at length separating into 2 spreading follicles. *Ripe* carpels very variable, fleshy, about 6 in. long. *Seeds* compressed, .75 in. long, surrounded by a coma twice as long.

N. C. HILLS, GARO HILLS, DARRANG, GOALPARA. (also cultivated).

Flrs. Rainy season. Fr. Cold season.

2. *Beaumontia khasiana* Hk. f.

A large climber. *Leaves* 8-10 by 4-4.5 in., elliptic or obovate-acuminate, tomentose beneath. *Flowers* short.

Peduncles and *pedicels* long. *Calyx-segments* .5 in. long. *Corolla* about 2 in. long, broadly campanulate; lobes rounded, equalling the tube; limb 4 in. across.

KHASI HILLS, (Nongkhlaw-Lobb).

Flrs. 3.

No specimen in Forest herbarium, Shillong. No type sheets in Calcutta herbarium. There are some sheets from cultivated plants only (flowers.)

3. *Beaumontia longituba* Craib. (Report. Sp. Nov. Vol. XII, 1913).

A large climber. *Bark* pale brown, reticulately seriate, somewhat lenticellate; branches glabrescent. *Leaves* 6.5 by 2.5 in., oblanceolate or oblong, caudate-acuminate, chartaceously coriaceous, more or less glabrous on both sides; lateral nerves about 12 on either half, anastomosing into an intramarginal nerve, conspicuous above or somewhat uniform, more prominent beneath; base cuneate or broadly cuneate; petiole .5 in. long, channelled above. *Calyx-segments* linear-lanceolate, .4 in. long. *Corolla* tube 1.7 in. long; lobes oblong, about .7 in. long, .4 in. broad. *Filaments* about .33 in. long, glabrous; anthers .4 in. long. *Style* 1.5 in. long; base shortly pubescent, glabrous towards the upper end.

Allied to *Beaumontia khasiana*.

MANIPUR (Meebold-6615), 4,000 ft.

20. CHONEMORPHA G. Don.

Stout woody large climbing shrubs. *Leaves* opposite, large and broad, nerves arching. *Flowers* 5-merous, large, white, in lax terminal and pseudo-axillary paniculate cymes. *Calyx* with a ring of glands within. *Corolla* salver-shaped; tube short, lower part narrow, upper part wider; throat naked; lobes broad, oblique, overlapping to the right. *Stamens* 5, included; filaments short, villous; anthers sagittate, elongate, connivent over and adhering to the stigma, cells shortly spurred at the base. *Disc* thick, annular or cupular. *Carpels* 2, distinct; style filiform, cleft at base; stigma conoid or subclavate; ovules many. *Follicles* long, straight, woody, triquetrous. *Seeds* ovoid or oblong, prduced in a beak surrounded

by a large silky coma; albumen thin; cotyledons flat-oblong, radicle short.

Leaves large; lateral nerves 8-12; petiole	
·5-2 in. long. 	1. <i>C. macrophylla</i> .
Leaves smaller; lateral nerves 10-14; petiole	
·5-1 in. long. 	2. <i>C. Griffithii</i> .

1. *Chonemorpha macrophylla* G. Don. Vern. *Samphari*, Manip.; *Banpumloai*, Naga; *Ther-jarmi-kongwan*, Khasi.

A large powerful climber with copious milky juice, branches lenticellate; young parts pubescent. *Leaves* very large, 6-18 by 5-12 in., elliptic-ovate, obovate or suborbicular, cuspidate, coriaceous, glabrescent above, pubescent below; lateral nerves 8-12, strong, distant, almost parallel, arcuate; reticulation transverse, irregular; base rounded or cordate; petiole ·5-2 in. long; stipules reduced to glandular tooth. *Flowers* large, fragrant, pure white, 2·5-3 in. across, in axillary or peduncled pubescent cymes; bracts ovate, deciduous; pedicels 3-4 in. long. *Calyx* ·5 in. long, tubular, widened upwards; segments lanceolate-acute. *Corolla* 3·2 in. long; tube 1·4 in.; lobes spreading, obovate, up to 2 by 1·5 in.; clavate-lanceolate. *Follicles* double, 10-16 by ·6·75 in., often cohering by the tips, triquetrous, beak incurved. *Seeds* pale-brown, about 1 in. (including beak), ovoid, narrowed into beak, ·4 in. long, surrounded by a white silky coma 2·5 in. long.

GOALPARA, CACHAR, KHASI & JAINTIA HILLS, 4,000 ft.,
Yield a kind of Caoutchouc.

Flrs. 6-7. Fr. Cold season.

2. *Chonemorpha Griffithii* Hook. f. Vern. *Bomabondung*, Mech; *Langno-rikang*, Mik.; *Thar-sohwan*, Khasi.

A large evergreen woody climber. *Bark* grey, splitting vertically, ·25 in. thick, white inside with brown streaks, exuding copious milky juice; extremities pubescent or tomentose. *Leaves* 6-14 by 5-10 in., ovate, obovate or orbicular, obtuse or mucronate, coriaceous, glabrescent above, pubescent beneath; lateral nerves 10-14 on either half, quite

strong, prominent beneath; reticulation more or less transverse; base rounded or sub-cordate; petiole .5-1 in. long. *Flowers* 2-3 in. across, white with a pale yellow centre in 3-chotomous terminal pubescent cymes. *Calyx* segments 5, distinct, about .5 in. long. *Follicles* 2, (or by abortion single), sub-parallel, straight, green, shining, terete (drying trigonous), 11-16 in. long, hard, angled, beak recurved. *Seeds* pale-brown, .7 in. long, ovoid, narrowed into a beak, .2 in. long, crowned by a pale white silky coma, 2-3 in. long.

N.E. FRONTIER TRACT, N. C. HILLS, GOALPARA, KHASI HILLS, (4,000 ft.).

Yield a kind of Caoutchouc.

Flrs. 7. Fr. Cold season.

21. ECDYSANTHERA Hook. et Arn.

Ecdysanthera micrantha A. DC. Modern name *Parabarium micranthum* (Wall) Pierre. Vern. *Mie-ja-pharoan*, Khasi; *Dhopalat*, Ass.

A large woody climber; branches slender, pendulous, lenticellate, slightly puberulous. *Bark* white, rough; blaze white mottled yellow, exuding milky latex. *Leaves* opposite, 2-7 by 1-2.5 in., ovate-oblong or oblong-lanceolate, obtusely acuminate or caudate-acuminate, rather thinly coriaceous, usually glabrous; midrib impressed above; lateral nerves 4-6 on either half, slender, arcuate; base acute, cuneate or obtuse; petiole .2-.8 in., twisted. *Flowers* small, yellow in puberulous, stoutly peduncled, large paniced 3-chotomous cymes up to 10 in. long. *Calyx* very small, 5-fid; segments ovate, slightly pubescent. *Corolla* glabrous, urceolate; lobes falcate. *Anthers* obtuse, conniving over and adnate to the stigma. *Disc* annular. *Ovary* of 2 distinct carpels, puberulous, longer than the disc; stigma obpyriform. *Follicles* 3-4 by .75 in., spreading nearly horizontal, narrowed from above the base to an acuminate point, thickly coriaceous; endocarp shining, crustaceous. *Seeds* .75 in. long, compressed, pubescent, elliptic-lanceolate, crowned by white caducous silky coma up to 2.5 ft. long and a persistent ring of short

tawny bristly hairs; albumen scanty; cotyledons foliaceous; radicle short, cylindric.

. LAKHIMPUR, SIBSAGAR, KHASI HILLS.

Flrs. 3-4. Fr. Cold season.

22. AGANOSMA G. Don.

Stout evergreen climbing shrubs. *Leaves* opposite. *Flowers* in terminal or axillary tomentose cymes. *Calyx* divided nearly to the base; segments 5, narrow-lanceolate with subulate glands at the base. *Corolla* salver-shaped, lower part of tube short, cylindric, upper part wider, bearded with longitudinal villous bands; lobes overlapping to the right. *Stamens* at the base of the upper part of the corolla tube, included; anthers sagittate, rigid, connivent over and adnate to the stigma, spurred at base. *Disc* cupular, 5-lobed. *Ovary* of 2 distinct usually hirsute carpels; style short, unshaped at top; stigma columnar; ovules many. *Follicles* terete, straight or curved, sometimes cohering at the tip. *Seeds* glabrous, ovate or linear-oblong, flattened, not beaked, crowned with a deciduous silky coma; albumen scanty; cotyledons oblong; radicle short, superior.

Calyx segments about .3 in. long, shorter than corolla tube. Ovary half sunk in the disc. Ovary glabrous. Cymes chiefly axillary. Leaves 2.5-4 by .7-1.5 in.

1. *A. marginata*.

Calyx segments .6 in. long or more, longer than the corolla tube. Ovary half sunk in the disc. Ovary pubescent. Cymes terminal:—

Leaves rather coriaceous; lateral nerves 3-5 on either half. Cymes lax pubescent.

2. *A. caryophyllata*.

Leaves membranous; lateral nerves 8-10 on either half. Cymes glabrescent.

3. *A. gracilis*.

Leaves rather coriaceous; lateral nerves 6-7 on either half. Cymes dense tomentose.

4. *A. cymosa*.

1. *Aganosma marginata* G. Don.

An evergreen large shrub; branches stout, prominently warty, stem stout, twisted; branchlets lenticellate, extremities pubescent. *Leaves* 2.5-4 by .7-1.5 in., linear-oblong, oblong-lanceolate or elliptic-oblong, bluntly acuminate, rather

coriaceous, glabrous above, obscurely puberulous beneath; midrib impressed above, slightly channelled; lateral nerves 9-12 on either half (with slender and shorter intermediate ones) joined by a prominent looped intramarginal vein away from the margin of the blade. *Flowers* white, in more often axillary puberulous lax cymes. *Calyx-segments* .25 in., lanceolate-acuminate. *Corolla* tube .25-.3 in. long, slender, lobes twice as long. *Ovary* glabrous. *Follicles* double, up to 20 by 3 in. long. *Seeds* blackish, linear-oblong with one acute end, hooked; coma 2 in. long on the blunt tip.

SYLHET.

Flrs. 6-7. Fr. Cold season.

2. *Aganosma caryophyllata* G. Don. Modern name *Aganosma dichotoma* (Roth) K. Schum. Vern. *Khiri-shompa-doukha*, Kach.

A large woody climber with milky latex. *Bark* covered with brown fissured cork; inside light reddish-white. *Leaves* 1.5-4.5 by 1-2.5 in., ovate or elliptic-obtuse, shortly acuminate, rather coriaceous, glabrous or tomentose beneath; lateral nerves impressed above, slender, 3-5 on either half, oblique; base rounded or acute; petiole .2-.4 in. long. *Flowers* large white, 1.5 in. across in lax pubescent corymbose cymes. *Calyx* segments linear-lanceolate, glandular within, tomentose outside, spreading, .6 by .12 in., pale white or dull green. *Corolla* tube ribbed, tapering to throat about as long as the calyx segments; lobes snow-white, 1.25-1.5 by .25 in., falcate, twisted to the left, overlapping to the right, inner margin often crisped; throat slightly hairy, pale yellow; anthers apiculate, forming a cone at the base of corolla tube, sessile or nearly so. *Disc* large, concealing the ovary. *Follicles* densely woolly tomentose, variable. *Seeds* flat, .6-1 in. long, hollowed near the tip; coma larger.

N. C. HILLS, NOWGONG.

Flrs. 5. Fr. Cold season.

3. *Aganosma gracilis* Hook. f.

A climbing shrub with slender stems and branches. *Leaves* elliptic-acuminate, membranous, glabrous; lateral

nerves 8-10 on either half, slender, arching. *Flowers* in terminal corymbose cymes, glabrescent; pedicels slender, long. *Calyx-segments* 1.5 in. long, linear-hoary. *Corolla* tube .7-.8 in. long; lobes 1.5 in. long, oblique-ob lanceolate.

KHASI HILLS (3,000 ft.).

No specimen in Forest herbarium, Shillong.

4 *Aganosma cymosa* G. Don.

A stout rambling climber, glabrous; young parts tomentose. *Leaves* 2.4 by 1.2-1.9 in., elliptic-oblong or elliptic-lanceolate, acute or sharply acuminate, glabrous; lateral nerves 5-7 on either half, slender; base acute or cuneate; petiole .3-.5 in. long. *Flowers* in dense terminal tomentose cymes. *Calyx* teeth .2-.5 in. long. *Corolla* tube .16-.3 in. long; lobes .2-.3 in., ovate-acuminate. *Ovary* hirsute. *Follicle* divaricate, 4 in. long.

SYLHET.

Flrs. 4-7. Fr. 8-11.

23. RHYNCHODIA Benth.

Rhynchodia Wallichii Benth. Modern name *Rhynchodia rhynchosperma* (Wall) K. Schum. Vern. *Gohinga*, Ass.

A large woody climbing shrub. *Bark* blackish, .12 in. thick, warty; blaze white with brown vertical lines, exuding milky juice; branchlets rough, lenticelled; leaf scars prominent. *Leaves* opposite or ternate, 3-8 by 1.5-4 in., elliptic-ovate or elliptic-oblong, cuspidate, shortly acuminate or acute, rather thinly coriaceous, glabrous; lateral nerves distinct, 7-11 on either half, sub-parallel, looped into a rather obscure intramarginal nerve; tertiaries prominently reticulated; base cuneate or rounded, often unequal; petiole .2-1 in. long. *Flowers* fragrant, showy, white in lax axillary or sub-terminal puberulous paniculate cymes, secondary branching subumbellate; pedicels .5 in. long; buds clavate. *Calyx* glandular within, campanulate; segments sparsely pubescent, oblong-lanceolate, obtuse, margin reflexed. *Corolla* tube (and throat pinkish); tube inflated, angled, .3 in. long; throat

contracted, villous within; lobes obovate, twisted. *Anthers* sagittate, connivent round and adnate to the stigma. *Disc* cup-shaped, 5-lobed. *Ovary* of 2 distinct carpels; ovules many; stigma columnar. *Follicle* pendulous, 12-18 in. long. *Seeds* ovate-oblong, narrowed into a long beak, .8 in. long; crowned by a white silky deciduous coma up to 2.5 in. long, exalbuminous; cotyledons oblong; radicle short, superior, cylindric.

LAKHIMPUR, SIBSAGAR, GOALPARA.

Flrs. 3-5. Fr. Cold season.

24. ANODENDRON A. DC.

Anodendron paniculatum A. DC. Modern name *Anodendron manubriatum* (Wall) Merr.

A very large woody climber; stem stout. *Bark* smooth, greyish black or brownish; blaze white with brown patches (Haines). *Leaves* 3.5-6 by 1.5-2.5 in., elliptic or oblong, cuspidate, coriaceous, shining above, glabrous; lateral nerves 12-15 on either half, slender; base usually rounded; petiole stout, .25-.65 in. long. *Flowers* small, pale yellowish in large 3-chotomous axillary and terminal paniced cymes. *Calyx* glabrous, 5-cleft; segments ovate-acute. *Corolla* tube short, throat hairy; lobes linear, obtuse, falcate, twisted, overlapping to the left in bud. *Anthers* connivent round the stigma and adnate to it. *Ovary* of 2 distinct carpels sunk in the disc. *Follicles* divaricate, through an angle of 150°-160°, terete, glabrous, narrowed to an obtuse point. *Seeds* up to 12, compressed, 1.2 in. long, ovate-elliptic with a long straight slender beak, crowned by a white silky coma up to 2 in. long.

GOALPARA.

It is said to produce rubber.

Flrs. 3-4. Fr. 1.

25. TRACHELOSPERMUM Lemaire.

Climbing shrub. *Leaves* opposite with an interpetiolar bristly ridge. *Flowers* white or pinkish, in lax terminal and pseudo-axillary cymes. *Calyx* small, 5-partite, with scales or glands at the base within. *Corolla* salver-shaped; mouth constricted; lobes 5, oblique, twisted, overlapping to

the right. *Stamens* united above the middle of the tube; included or shortly exserted; filaments short, broad; anthers connivent over and adhering to the stigma; cells spurred. *Disc* annular or glandular. *Ovary* of 2 distinct carpels; style slightly expanded at the top; stigma columnar; ovules numerous. *Follicles* elongate, slender, terete. *Seeds* linear, not beaked, crowned by long dense coma; albumen copious; cotyledons linear-flat; radicle short, superior.

Cymes long peduncled. Corolla tube larger than the calyx, much wider near the mouth; stamens inserted in the upper portion :—

Corolla glabrous. Anther-tips exserted. .. 1. *T. gracilipes*.

Corolla pubescent. Anthers included. .. 2. *T. fragrans*.

Cymes short-peduncled. Corolla tube short not much wider near the mouth. Stamens inserted in the lower portion. Anthers included. .. 3. *T. axillare*.

1. *Trachelospermum gracilipes* Hook. f.

A climber, glabrous. *Leaves* 1-2·5 by ·5-1 in., elliptic-acute, sub-coriaceous, glabrous; lateral nerves 7-9, slender, looped into an inter-marginal nerve; petiole ·1-·2 in. long. *Flowers* ·6 in. across, in loose corymbose cymes; pedicels very slender, ·25 in. long. *Calyx* segments ovate-lanceolate, sub-acute with lacinate scales at the base. *Corolla* glabrous; tube ·25 in. long, contracted at the mouth; lobes obliquely oblong, ·25 in. long. *Anther* tips apiculate protruding beyond the corolla. *Disc* of oblong glands. *Fruit* not seen.

SIBSAGAR, KHASI & JAINTIA HILLS.

Flrs. 4.

2. *Trachelospermum fragrans* Hook. f. Modern name *Trachelospermum lucidum* (D. Don) K. Schum. Vern. *Purai-timit*, Miri; *Akhahilata*, Ass.; *Chiri-nai-nai-rikang*, Mik.; *Soh-kyrmoit-kroh*, Khasi.

A large woody climber. *Bark* blackish warty, thin; blaze yellowish, exuding milky juice; large stems tubercled appearing to be spinous; branchlets pendulous. *Leaves* 2-5 by ·5-1·5 in., elliptic-oblong or elliptic-lanceolate, acuminate, sub-coriaceous, glabrous, shining above, paler beneath; lateral nerves 10-15 on either half; petiole ·15-·5 in. long, puberu-

lous, glandular in the axils. *Flowers* white, fragrant, in lax trichotomous pedunculate paniced cymes. *Corolla* salver-shaped with a campanulate mouth; tube .35 in. long; lobes oblong, hairy at the base, unequal sided, twisted to the left, overlapping to the right. *Disc* glandular, quadrate. *Follicles* 5-15 in. long, cylindrical, acuminate, incurved. *Seeds* .7 in. long, linear, flattened, crowned by a copious coma of white hairs up to 1.3 in. long.

N.E. FRONTIER TRACT, LAKHIMPUR, SIBSAGAR, N. C. HILLS, KHASI & JAINTIA HILLS (5,000 ft.).

Flrs. 3-6. Fr. 11-2.

3. *Trachelospermum axillare* Hook. f. Vern. *Mium-kyrmid*, Khasi.

A stout climber, quite glabrous; old branches lenticelled. *Leaves* 2.5-5 by 1.1-5 in., elliptic-oblong or oblanceolate-acuminate, coriaceous and glabrous; lateral nerves 13 on either half; base joined with an obscure inter-marginal nerve; base obtuse or cuneate; petiole .1-3 in. long. *Flowers* purplish in axillary sub-sessile cymes; pedicels up to .6 in. long. *Calyx* segments ovate-ciliate, .15 in. long. *Corolla* .2 in. long; lobes linear-oblong-obtuse; glands glabrous. *Ovary* pubescent. *Follicles* rusty-tomentose, cylindric, curved, 6-8 by .4 in. *Seeds* .75 in. long, slender, crowned by a copious tawny coma 2 in. long.

Shillong Peak (K. & J. HILLS).

Flrs. 7. Fr. Autumn season.

Trachelospermum auritum Schneider.

A scandent shrub; branches fistulose. *Leaves* 3.4-7.2 by 1.5-3.7 in., broadly elliptic or somewhat obovate, entire, shortly caudate-acuminate, membranous, strigosely ciliate; lateral nerves about 10 on either half; base cordate; petiole short .1-4 in. long. *Inflorescence* terminal; bracts lanceolate, pilose. *Calyx-segments* linear-lanceolate .12-17 in. long. *Corolla* white, hypocrateriform; tube about .6 in. long with constricted base; lobes oblong, spatulate. *Ovary* villose at the apex; disc 5-lobed; style fine; stigma somewhat oblong. *Follicles* 6.5 in. long, .6 in. broad, divergent; apex somewhat racemed; seeds .8 in. long, coma 1.5-1.7 in. long, purplish-brown.

KHASI HILLS, MANIPUR.

26. ICHNOCARPUS Br.

Ichnocarpus frutescens Br. Vern. *Lamkandol*, Manip.; *Paharukibandan*, Mech.

A large dextrorse twiner. *Bark* reddish-brown with circular raised lenticels, extremities rusty tomentose. *Leaves* 2-4 by 1-2 in., elliptic or elliptic-oblong, acuminate or acute, sub-coriaceous, glabrous and dark-green above, more or less rusty pubescent beneath specially along the nerves; petiole .2-.3 in. long with an intra-petiolar ridge. *Flowers* greenish white, fragrant, .2-.5 in. across in axillary or terminal cymes, often forming leafy panicles; bracts minute. *Calyx* pubescent, 5-cleft, glandular inside; segments ovate-oblong. *Corolla* salver-shaped; tube .1-.15 in., dilated inside round the included anther; throat contracted, villous; lobes 5, narrowed, ciliate, overlapping to the right. *Anthers* sagittate, bluntly spurred, conniving over and adhering to the stigma. *Disc* minutely lobed. *Ovary* of 2 distinct carpels; style short; stigma thick, oblong, jointed to an elongate conical tip; ovules many. *Follicles* 3-6 by .5 in., slender, cylindrical, straight, usually double, rusty tomentose when young. *Seeds* numerous, .5-.7 in. long, linear with a scanty short coma.

SIBSAGAR, KAMRUP, NOWGONG, SYLHET, CACHAR, GARO HILLS, GOALPARA.

Baskets and fishing traps are made of the switchy branches. The root is used as a substitute for Sarsaparilla. The stalks and leaves are used in the form of a decoction in fevers. (I. M. Plants).

Flrs. 4-6. Fr. 10-12.

27. MICRECHITES Miquel.

Microchites elliptica Hk. f.

A large climbing shrub. *Bark* pale brown; branches obscurely ribbed. *Leaves* 2.5-5 by 1-2 in., elliptic-lanceolate or elliptic-oblong, shortly acuminate, chartaceous, glabrous, reddish; lateral nerves slender, numerous; base acute or rounded, slightly oblique; petiole .3-.5 in. long. *Flowers* small in axillary or terminal pubescent thyrsoid cymes. *Calyx* 5-fid, glandular within; segments pubescent outside, ovate-oblong, obtuse. *Corolla* salver-shaped; tube

·17 in. long; lobes 5, oblique, overlapping to the right. *Stamens* included; anthers sagittate conniving round the stigma and adnate to it; cells spurred at the base. *Ovary* of 2 distinct carpels; stigma clavate. *Follicles* divaricate, sub-cylindric, lanceolate, 4 by ·8 in., obscurely ridged when dry. *Seeds* blackish, flat, oblong (not beaked) concave, ·45-2 in., coma deciduous, silky, 1·2 in. long.

KHASI & JAINTIA HILLS (4,000 ft.).

Flrs. 7. Fr. 12.

FAM. 86. ASCLEPIADACEÆ.

Herbs or shrubs frequently climbing with milky acid juice. *Leaves* opposite, rarely alternate, sometimes wanting, entire, exstipulate. *Flowers* regular, hermaphrodite, 5-merous, usually in umbelliform cymes. *Calyx* inferior, deeply divided; segments imbricate, usually with minute process or glands at the base within. *Corolla* various, hypogynous; tube usually short, often furnished with processes or hairs within or at the mouth (corolline corona); lobes valvate, imbricate or contorted, often recurved and connate at the tips. *Stamens* inserted at or near the base of the corolla and alternating with the lobes; filaments flat, rarely free, usually connate in a tube round the ovary (staminal column), the apex of the tube often united to the dilated part of the combined styles and usually with fleshy scales or processes on the back (staminal corona); anthers 2-celled, margins of the anthers or their basal processes more or less horny or usually projecting downwards as wings on the staminal column, the adjacent wings of each pair nearly meeting; connectives of the anthers often produced into membranous and sometimes connate tips; pollen forming 1 or 2 granular

masses in each cell; the pollinia of the adjoining cells or 2 contiguous; anthers united in pairs or fours to a gland (corpuscle) which lies on the edge of the dilated portion of the style between the anthers. *Ovary* of 2 distinct superior carpels enclosed within the staminal column; style 2, short, united above into a large stigma, usually 5-angled, included between the anthers or produced beyond into a long or short, simple or bifid column; ovules many, multiseriate on the projecting placentæ. *Fruit* usually of 2 follicles, sometimes 1 by suppression. *Seeds* compressed, usually flat, often marginal, crowned with a coma or long silky-hairs; albumen straight; cotyledons flat; embryo large.

Filaments free. Pollinia granular in pairs in each :—

- | | | | |
|--|---------|----|-----------------------|
| Coronal scale 0. Anthers bearded. | .. | 1. | Pentanura. |
| Corona corolline :— | | | |
| Corolla small or middle sized, greenish. | .. | 2. | Cryptolepsis. |
| Corolla large, subcampanulate, purple. | .. | 3. | Cryptostegia. |
| Corona staminal :— | | | |
| Cymes short, sessile. Corolla-lobes ovate. | | 4. | Streptocaulon. |
| Cymes loosely paniced. Corolla-lobes lanceolate. | .. .. . | 5. | Myriopteron. |
| Coronal scales connate into a lobed ring. | | | |
| Corolla rotate. | .. .. . | 6. | Periploca. |

Filaments connate. Pollinia waxy :—

Anthers with a membranous tip.

Pollinia pendulous from the corpuscle :—

- | | | | |
|---|---------|----|--------------------|
| Pollen masses in pairs in each cell. | | | |
| Corolla rotate; lobes overlapping to the tip. | .. .. . | 7. | Toxocarpus. |

Pollen masses solitary in each cell :—

- | | | | |
|-------------------------------------|----|----|-------------------|
| Corona both corolline and staminal. | .. | 8. | Oxystelma. |
|-------------------------------------|----|----|-------------------|

Corona staminal (5 processes) adnate to the anthers; pollinia pendulous from the corpuscle :—

Erect, leafy :—

- | | | | |
|--|---------|-----|---------------------|
| Coronal process spreading, fleshy sculptured. | .. .. . | 9. | Calotropis. |
| Coronal process spathulate. | .. | 10. | Asclepias. |
| Corona single staminal. Corolla campanulate, large, white. | .. | 11. | Raphistemma. |
| Corona of 10-lobed ring and 5 horny processes. | .. .. . | 12. | Holostemma. |
| Corona annular. | .. .. . | 13. | Cynanchum. |

Pollen masses erect. rarely horizontal or pendulous. Anthers usually with a membranous inflexed apex. Corolla lobes overlapping:—

Corona single, corolline of pubescent ridges. 14. *Gymnema*.

Coronal process adnate to the staminal column:—

Coronal scales simple, minute; corolla more or less campanulate. 15. *Marsdenia*.

Coronal scales rounded. Corolla more or less salver-shaped. 16. *Telosma*.

Coronal process minute or 0:—

Corolla urceolate. 17. *Gongronema*.

Corolla rotate:—

Flower middle-sized. Coronal processes stellately pubescent. Pollinia oblong. 18. *Dregea*.

Flowers small. Coronal processes tubercled. Pollinia oblong. 19. *Tylophora*.

Flowers large. Coronal processes simple, ovate-obtuse. Cymes umbelliform. 20. *Treutlera*.

Corolla valvate:—

Corolla minute, urceolate. Coronal scales membranous, erect. 21. *Dischidia*.

Corolla rotate. Coronal scales stellate. Stigma truncate, 5-angled. Pollen masses sessile. 22. *Heterostemma*.

Corolla rotate. Corona very large, stellately spreading. Stigma flat or apiculate at the centre. Pollen masses pedicelled. 23. *Hoya*.

Anthers without a membranous apex.

Pollinia sessile, erect, 1 in each cell.

Corona staminal. Corolla tube long. Twinning shrub. 24. *Ceropegia*.

1. PENTANURA Blume.

Pentanura khasiana Kurz.

A twining glabrous shrub. *Leaves* 3·5 by ·8·1·5 in., elliptic or elliptic-lanceolate, acuminate, coriaceous, glabrous; lateral nerves 7-10 on either half, conspicuous, arcuate; midrib stout; tertiaries finely reticulated; base acuminate or cuneate; petiole ·4··8 in. long. *Flowers* in shortly peduncled axillary fascicles. *Calyx* 5, glandular within, ovate-

lanceolate, about .1 in. long. *Corolla* sub-campanulate; lobes purplish, sparsely pubescent within, ovate-lanceolate, acute, .35 in. across. *Corona* absent. *Filaments* free; anthers arching adnate to the stigma; pollen granular; pollen masses flabellate, stipitate in pair on the corpuscles; connective produced into a spatulate appendage which is bearded. *Style* apex capitate, 5-angled. *Follicles* divaricate, .3 in. long, incurved, obtuse. *Seeds* ending in tufted silky coma.

KHASI HILLS (up to 4,000 ft.).

Flrs. 6-7. Fr. 10.

2. CRYPTOLEPSIS Br.

Twining shrubs, glabrous. *Flowers* in slender lax terminal or axillary few-flowered pedunculate cymes; bracts and bracteoles small. *Calyx* deeply segmented with 5-scales within. *Corolla* tube short, cylindric or campanulate; lobes narrow, overlapping and twisted to the right. *Corolline* corona of 5-linear or clavate conniving scales inserted near or above the middle of the tube. *Filaments* sub-connate at their broad bases; anthers with conniving acuminate tips; pollinia cohering in pairs in each cell, granular with oblong appendages. *Stigma* broadly conical. *Follicles* divergent, terete.

Lateral nerves parallel. *Corolla* .7 in. across
Calyx-segments acute. *Follicles* stout, 4 in. or less.

1. *C. Buchanani*.

Lateral nerves not parallel. *Corolla* 1.1-1.5 in. across. *Calyx*-segments obtuse. *Follicles* very slender, 5 in. or more.

2. *C. elegans*.

1. *Cryptolepsis Buchanani* R. & Sch. Vern. *Garang-gisim-dukha*, Kach.; *Rhui-wong*, Kuki; *Durikhal*, Garo; *Kombat-ngiang-pur*, Khasi.

A large dextrorse evergreen twiner with copious milky-juice. *Bark* smooth, copper-coloured, peeling off in papery rolls in old stems. *Branches* lenticellate. *Leaves* 3-6 by .8-2.5 in., oblong-elliptic or elliptic-oblong, acute or obtuse, abruptly shortly acuminate, apiculate, coriaceous, smooth and glossy above, glaucous beneath; lateral nerves trans-

verse, parallel, terminating in an intramarginal vein; base usually acute; petiole up to .5 in. long. *Flowers* pale-yellow in lax dichotomous cymes, often paniced; peduncles .3-1 in. long; pedicels .1-.2 in. long; bracts ovate-lanceolate. *Calyx* segments ovate-acute. *Corolla* .7 in. across. *Follicles* 2-4 by .5-.7 in. stout, divaricate, tapering and pointed at the apex. *Seeds* compressed, oblong-ovate, about .25 in. long; coma about 1 in. long.

GOALPARA, GARO HILLS, N. C. HILLS, KAMRUP, DARRANG, NOWGONG, KHASI HILLS.

Flrs. 5-6. Fr. Cold season.

The milky-juice coagulates into a caoutchouc-like substance and is also believed to heal sores (N. C. Hills).

2. *Cryptolepis elegans* Wall. Vern. *Kinik-riube*, Miri.

A dextrorse climber. *Bark* brownish. *Branchlets* long, slender, brown; blaze exuding sticky latex. *Leaves* 1-3 by .5-1.5 in., elliptic or ovate, oblong or oblong-lanceolate, obtuse or acute with a cusp, glabrous, dark-green and shining above, glaucous beneath; lateral nerves not parallel; base rounded, cuneate or subcordate. *Flowers* in axillary or terminal cymes. *Calyx* segments obtuse. *Corolla* 1-1.5 in. across. *Follicles* divergent through an angle of about 180°, 5 by .25 in.; coma about 2 in. long, finely silky white.

CACHAR, GOALPARA, SIBSAGAR, LAKHIMPUR, KHASI HILLS.

Flrs. 6-7. Fr. Cold season.

Branchlets used for making fishing traps.

3. *CRYPTOSTEGIA* Br.

Cryptostegia grandiflora Br.

A large stout glabrous climber. *Leaves* 3-4 by 1.5-2 in., elliptic, obtuse, coriaceous, shining; nerves arcuate, faint; base acute; petiole .5-.6 in. long. *Flowers* large in terminal trichotomous cymes; bracts caducous. *Calyx*-segments lanceolate, .5-.6 in. *Corolla* campanulate, light purplish, about 2 in. across; lobes broad, overlapping and twisted to the right. *Corona* corolline at the base of the

throat. *Anthers* acute; pollinia in pairs in each cell granular, with sub-spathulate appendages. *Stigma* convex. *Follicle* 4-5 in. long, thick, woody, divaricate, 3-winged; seeds comose.

Cultivated in gardens; native of AFRICA or of MADAGASCAR.

Flrs. and Fr. Hot season and rainy season.

4. STREPTOCAULON Wight & Arn.

Streptocaulon sylvestre Wight.

A handsome perennial with woody rootstalk, prostrate, pubescent. *Leaves* .5-1.5 by .4-1.2 in., suborbicular or broadly ovate, tipped with a short cusp, membranous, pubescent; base rounded or subcordate; petiole .05-.1 in. long. *Flowers* small in paniced cymes. *Calyx* 5-partite, glandular within. *Corolla* 5-lobed; lobes short, ovate, overlapping to the right. *Corona* of 5-scales adnate to the back of the filaments. *Filaments* with interposed teeth or glands. *Follicles* smooth. *Seeds* comose.

ASSAM (Mann's No. 116).

Flrs. 5.

5. MYRIOPTERON Griff.

Myriopteron extensum (Wt.) K. Schum.=M. paniculatum Griff. Vern. *Chhagal-singa-lata*, Kamrup; *Ngyaniong-doukha*, Kach.

A slender climbing shrub with milky-juice. *Leaves* 3-5 by 1.5-2.5 in., suborbicular-oblong or elliptic-acute or bluntly acuminate, membranous, sparsely puberulous above, finely pubescent beneath; lateral nerves 5-8 on either half; base rounded or acute; petiole slender, .5-1.5 in. long. *Flowers* in few-flowered cymes. *Calyx* 5-partite, minutely glandular within. *Corolla* rotate, .3 in. across; lobes overlapping to the right, twisted to the left. *Coronal* scales 5 on the back of the filaments. *Filaments* connate in a ring below; anthers connivent above and adnate to the stigma, tips membranous; pollen masses in pairs in each cell, appendage of the corpuscles bifid. *Follicles* 2, turgid, straight with many longitudinal wings narrowed to the tip.

Seeds .3 in. long, concave, ribbed ventrally; coma about 1.25 in. long.

KAMRUP, N. C. HILLS.

Flrs. 6-7 (?) Fr. Cold season.

6. PERIPLOCA Linn.

Periploca calophylla *Falc.* Vern. *Meisoh-phrap-iong*, *Mei-reng-sai*, *Mei-ang-sla*, Khasi.

A large glabrous evergreen climber with milky-juice. *Bark* purplish-brown exfoliating in thin flakes; blaze white, exuding sticky latex. *Leaves* 2-5 by .2- in., linear-lanceolate, long, acuminate, coriaceous, shining above; lateral nerves numerous, parallel, united to form an intramarginal vein; petiole .05-.2 in. long. *Flowers* faintly scented, brown, stellate hairy, .3 in. across in lax cymes. *Calyx* glandular toothed. *Corolla* .25-.3 in. across; lobes greenish-yellow or pinkish, villous inside. *Corona* of 5 thick scales connate into a 10-lobed ring, usually furnished with 5 filiform aristas. *Stamens* free; filaments short; anthers bearded at the back and cohering laterally; pollen granular. *Stigma* convex. *Follicles* 5-6 by .25-.3 in., smooth, tapering to blunt point, usually in pairs, divaricate at an angle of 40°-50°. *Seeds* .5-.7 in long; coma about 1 in. long.

KHASI HILLS.

Flrs. 10-11. Fr. 4.

7. TOXOCARPUS Wight & Arn.

Twining shrubs. *Flowers* small in axillary pedunculate, paniculate or racemed cymes. *Calyx* small, 5 partite with or without minute scales within. *Corolla* salver-shaped; tube short, 5-lobed; lobes linear-oblong, overlapping to the left. *Corona* processes attached to the staminal tube, flattened. *Filaments* connate; anthers small, minutely fimbriate at tip, erect or connivent round the style apex; pollen masses very minute, pendulous, apparently in pairs in each, all attached to minute pale soft pollen-carriers without caudicles. *Ovary* of 2 carpels; style slender; style-apex produced beyond the staminal column. *Fruit* of 2 divaricate follicles. *Seeds*

oblong, flattened, tipped with a silky coma; cotyledons oblong, radicle cylindric.

Corolla lobes hairy within at the base. Coronal scales overlapping the anther cells; stigma unequal, 2-fid.

1. *T. himalensis*.

Corolla lobes entirely glabrous. Coronal scales triangular, shorter than the column; stigma long, fusiform.

2. *T. acuminatus*.

1. *Toxocarpus himalensis* Falc.

A small evergreen climber; young parts rusty tomentose. *Leaves* 3-5 by 1-2·5 in., lanceolate, broad-elliptic, elliptic-oblong, bluntly acuminate, pubescent; base rounded, subcordate or acute; petiole ·5-·6 in. long. *Cymes* rusty, 1-seriate. *Calyx* rusty pubescent. *Corolla* membranous, villous within at the base. *Coronal* scale overlapping the anther cells. *Follicles* rusty-pubescent, 4-5 in. long; coma 1·7 in. long.

KHASI HILLS, ASSAM.

Flrs. 4-5.

2. *Toxocarpus acuminatus* Benth.=*Goniostemma acuminatum* Wight.

Stem glabrous. *Leaves* 4-5 by 1-1·5 in., elliptic-lanceolate, glabrous, glossy on both surfaces. *Cymes* absent, glabrous. *Calyx* small, rounded. *Corolla* quite glabrous; lobes with a triangular scale adnate to the base. *Follicles* 5 by ·7 in.

SYLHET.

Flrs. 4-5. Fr. 9-10.

8. OXYSTELMA Br.

Oxystelma esculentum Br.

A perennial twiner; stem much branched, slender, glabrous. *Leaves* 1·5-5 by ·2-·3 in., linear or linear-lanceolate, acute or acuminate, membranous, deciduous, pale-green, puberulous or glabrescent; base usually acute; petiole ·1-·5 in. long. *Flowers* 1 in. across, large, showy, drooping in

pedunculate few flowered cymes; pedicels filiform, .5-.8 in. long. *Calyx* small, glandular within. *Corolla* pale rosy, about 1 in. across with a pubescent annular corolline; staminal corona of 5-scales, ovate-lanceolate; lobes with 2 keels adnate to the base of the staminal columns. *Anthers* with inflexed membranous deltoid tips; pollen-masses pendulous, 1 in each cell. *Follicles* 1.5-3 by .3 in., glabrous, tapering. *Seeds* very numerous, flat, ovate, black; coma about .8 in. long.

SIBSAGAR, LAKHIMPUR (Rangagora).

A decoction of the plant is used as a gargle in ulcerations of the mouth and in sore-throat. In combination with turpentine it is prescribed for itch. The fresh roots are held in Orissa to be a specific for jaundice (I. M. Plants).

Flrs. 8. Fr. Cold season.

9. CALOTROPIS Br.

Erect, hoary or glabrous shrubs, undershrubs or herbs, rarely sub-arboreous. *Leaves* thick and fleshy broad. *Flowers* 5-merous, large or medium-sized in umbellate or sub-racemose pedunculate cymes. *Calyx* glandular within. *Corolla* broadly campanulate or sub-rotate; lobes broad valvate. *Corona* of 5-scales radiating from the staminal column, fleshy, laterally compressed with dorsal spines. *Anther* tips membranous, inflexed; pollinia 1 in each cell, waxy, pendulous, stipitate. *Style-apex* depressed, 5-angled or lobed. *Follicles* short, thick. *Seeds* ovate; coma slender, silky.

Shrubs. Leaves subsessile:—

Coronal scales truncate. Buds ovoid.

Corolla lobes spreading, lavender lilac or bluish purple.

1. *C. gigantea*.

Coronal scales acute. Buds hemispheric.

Corolla lobes at first erect with purple blotch at the tip.

2. *C. procera*.

Herb or undershrub. Leaves petiolate. Coronal scales bilobed.

3. *C. Acia*.

1. Calotropis gigantea Br. Vern. *Wai-bulai-gedeba*, *Arka*, Sans.; *Akanda*, Beng.; *Akon*, Ass.

A large shrub, sometimes almost a small tree; blaze yellow, exuding latex. *Bark* deeply cracked, corky when of

sufficient size; young parts and undersurface of leaves covered with white floccose tomentum. *Leaves* sub-sessile, 4-8 by 1·5-4 in., ovate or oblong-acute, shortly acuminate or obtuse, coriaceous, glabrate when mature; base cordate with auricled lobes. *Flowers* 1·5-2 in. across, lavender lilac or bluish purple in axillary and terminal umbellate or sub-corymbose cymes covered with hoary floccose tomentum. *Buds* ovoid. *Corolla* lobes spreading. *Follicles* 3-4 by 1-1·5 in., recurved, turgid. *Seeds* ovate, minutely pubescent, ·25 in. long.

DARRANG, N. C. HILLS, KHASI HILLS.

The bast yields the well-known Madar-fibre. The floss is also used as a substitute for silk cotton for stuffing and can also be spun into thread mixed with cotton. The milky juice is regarded as a caustic and drastic purgative and is said to possess various medicinal values. The dried bark of the root is said to be an excellent substitute for Ipecacunha in the treatment of dysentery (I.M.P.). The fresh leaves are applied as dry fomentations for swellings. Pounded leaves are applied on burns (N. C. Hills).

Flrs. & Fr. Probably throughout the year.

2. *Calotropis procera* Br. Vern. *Akon-asing*, Miri; *Alarka*, Sans.

A shrub resembling *C. gigantea*. *Leaves* 6-9 by 3-5 in. *Flowers* purplish red, faintly scented, ·5-1 in. across. *Buds* hemispheric. *Corolla* lobes erect. *Follicles* similar to above species.

N. E. F. TRACT, DARRANG, K. & J. HILLS.

The medicinal properties are similar to those of *C. gigantea*.

Flrs. & Fr. throughout the year but chiefly by the end of cold season and beginning of hot season.

3. *Calotropis Acia* Hamilt.

Herbs or undershrubs; young parts floccose, tomentose. *Leaves* 5-9 by 2-5 in., obovate, oblanceolate or oblong, abruptly short, acuminate or acute; lateral nerves 6-7 on either half, narrowed into a short petiole, ·25-1 in. long. *Flowers* purplish, about 1 in. across in branched umbellate cymes. *Buds* conical. *Peduncles* up to 2 in. long. *Calyx* lanceolate about ·3 in. long. *Corolla* lobes erect, acuminate

with a bluish or purplish patch near the apex. *Corona* ciliate, 2-lobed. *Follicle* 4 in. long, sub-globose.

GOALPARA, KAMRUP.

Flrs. & Fr. 12-5.

10. ASCLEPIAS Linn.

***Asclepias curassavica* Linn.** Vern. *Khim-nana*, Cach.; *Sap-par*, Kuki.

A perennial erect herb. *Leaves* 1-4 by .3-.8 in., lanceolate or oblong-lanceolate or elliptic-lanceolate, acuminate, membranous; base acute; petiole .1-.3 in. long. *Flowers* bright, orange red in umbellate cymes. *Calyx* glandular within. *Corolla* rotate, deeply 5-lobed, reflexed. *Coronal scales* 5, erect, spoon-shaped, adnate to the staminal column. *Anther-tips* membranous, reflexed; pollinia 1 in each cell, waxy pendulous, flattened. *Ovary* of 2 distinct carpels. *Follicles* 2-2.5 in. long, smooth, inflated, beaked. *Seeds* flattened; coma silky.

N. E. F. TRACT, N. C. HILLS (Cultivated and escapes).

It is said to be efficacious in dysentery. The root is regarded as a purgative and consequently astringent. It is also a remedy in piles and gonorrhœa.

Flrs. & Fr. 11-5.

11. RAPHISTEMMA Wall.

***Raphistemma pulchellum* Wall.**

A large twining shrub; branches herbaceous. *Leaves* 3-8 in., ovate-cordate, acuminate, membranous, glabrescent above, fine pubescent beneath, specially along the nerves; midrib glandular at base; nerves stout, 5-7; petiole 2-5 in. long with glandular stipular line. *Flowers* in pedunculate umbellate cymes. *Calyx* glandular within. *Corolla* white, campanulate, 5-lobed; lobes spreading, over-lapping to the right. *Staminal* corona of 5 scales adnate to the column and are produced into long slender ligules; anthers with an inflexed membranous tip; pollinia solitary in each cell, pendulous, waxy, not compound. *Follicles* thick, solitary, 5 by 1.25 in., turgid, fusiform with a slightly curved beak.

ŠIBSAGAR (Gaurisagar).

Flrs. Rainy season. Fr. 9.

12. HOLOSTEMMA Br.

Holostemma annulare K. Schum=H. Rheedei Wall.

A glabrous, usually much branched twiner. *Leaves* 2-5 by 1.5-3 in., ovate-acute or acuminate, cordate, glabrous above, slightly pubescent, specially along the nerves beneath; midrib usually glandular at the base, usually 5 basal nerved; tertiary nerves fine, reticulate, often red; basal lobes rounded; petioles up to 2 in. long. *Flowers* in peduncled cymes, often umbellate. *Calyx* divided nearly to the base; segments ovate, obtuse, ciliate. *Corolla* 1-1.3 in. across, deeply divided; lobes ovate or oblong-obtuse. *Corona* of a short truncate or slight undulate ring attached to the base of the staminal column; filaments connate; anthers with large wing which are decurrent to the base of the staminal column with membranous inflexed tips; pollinia solitary in erect cell long, stipitate. *Follicles* 4-5 by 1.3-1.5 in., glabrous, tapering to a point; come about 1 in. long.

K. & J. HILLS, GOALPARA.

Flrs. 8-9. Fr. Cold season.

13. CYNANCHUM Linn.

Erect or twining herbs or shrubs. *Leaves* opposite, rarely whorled. *Flowers* 5-merous, greenish or purplish in axillary umbellate racemes or subpaniculate peduncled cymes. *Corolla* rotate; lobes overlapping to the right or valvate. *Corona* adnate to the base of the staminal column, annular, cupular or tubular, variously toothed or toothed with or without scales or tubercles on the inner face opposite to the lobes; anthers sessile or stipitate with membranous reflexed tips; pollinia solitary in each cell, not compressed, pendulous, waxy. *Ovary* of 2 carpels; style apex 5-angled, truncate, rounded or conical. *Follicles* terete, often winged, sometimes clothed with soft spines. *Seeds* plano-convex, tipped with silky coma.

Inflorescence corymbiform cymes:—

Corolla lobes as long as the corona:—

Leaves orbicular. 1. *C. corymbosum*.

Inflorescence umbellate cymes:—

Corolla lobes longer than the corona:—

Leaves lanceolate 2. *C. Wallichii*.

1. *Cynanchum corymbosum* Wight.

Climber with rather stout stem. *Branchlets* glabrous. *Leaves* 2-5 by 1-2·5 in., ovate or orbicular, cuspidate or acuminate, membranous, dull green above and glaucous beneath, junction of midrib with petiole glandular above; base cordate; petiole 1-3 in. long. *Flowers* in densely corymbiform cymes. *Peduncles* slender. *Calyx* 5-cleft. *Corolla* campanulate; lobes obtuse with somewhat reflexed margins. *Corona* campanulate as long as corolla lobes, irregularly lobed or crenate, plicate. *Follicles* large, usually single, lanceolate, 3-5 by 1·5-2 in., covered with long soft numerous hooked spiny processes. *Seeds* dark-brown, margined, ovate-orbicular, ·5 by ·3 in., wrinkled, dentate, crenate; coma up to 1·5 in. long.

DARRANG, KHASI HILLS, SYLHET, CACHAR.

Flrs. Rainy season. Fr. 1.

2. *Cynanchum Wallichii* Wight.

A twining shrub, glabrous. *Leaves* 1·5-4·5 by ·6-2 in., ovate-lanceolate, acuminate, membranous, glabrous; basal nerves 5-7; base cordate with rounded incurved lobes; petiole ·7-2 in. long. *Flowers* in shortly peduncled umbellate cymes. *Corolla* greenish; lobes oblong-lanceolate, larger than the corona. *Corona* campanulate, plicate; lobes dentate. *Follicles* 4-5 by ·3-·6 in., reddish brown, lanceolate-acuminate. *Seeds* ovate-orbicular, margined, darkish brown, ·4 by ·25 in.; coma 1·75 in. long.

Flrs. 8. Fr. 12.

Cynanchum deltoideum Hook. f.

Twiner, almost glabrous; stem slender. *Leaves* 2-3 in. long, and almost as broad, deltoid-cordate, acuminate, membranous, pale beneath; basal lobes broad, rounded; sinus broad; petiole 1-1·5 in. *Flowers* small, glabrous in many flowered umbellate cymes; peduncles slender; pedicels hairy. *Calyx* segments ovate, glabrous. *Corona* 10-lobed, connecting the sessile column; lobes alternately large and small; larger lobes ovate, thickened; smaller lobes rounded, membranous.

KHASI HILLS (Mawflang) 5-6,000 ft. (F. B. I. IV. 24).

14. GYMNEMA Br.

Twining shrubs or undershrubs. *Flowers* small in crowded umbelliform cymes. *Calyx* 5-partite. *Corolla* sub-rotate, campanulate or urceolate; lobes thick, twisted, sub-valvate or narrowly overlapping to the right. *Corolline* corona of 5 fleshy processes, adnate to the corolla tube or throat. *Staminal* column short; anther tips small, membranous; pollinia erect, sub-sessile. *Style* apex larrgg, conical, *clavate* or capitate, exserted beyond the anthers. *Fruit* of 2 (or 1) smooth. *Seeds* ovate, margined; coma silky; cotyledons elliptic.

Corolla tube short. Coronal processes protruding more or less from the mouth of the corolla:—

- | | | |
|--|-------|---------------------------|
| Leaves tomentose beneath (3·5-6 by 1·8-2·5 in.). Cymes subcapitate. | .. .. | 1. <i>G. acuminatum</i> . |
| Leaves almost glabrous (2·4 by ·7-1·8 in.). Cymes umbellate. | .. .. | 2. <i>G. lactiferum</i> . |
| Leaves glabrous (1·5-4 by 1·2-2·5 in.) except the midrib and the nerves. Cymes binate. | .. .. | 3. <i>G. latifolium</i> . |
| Corolla elongate. Coronal processes not extending to the mouth of the corolla. Leaves glabrous (2·5-6 by 1·5-3·5 in.). | .. .. | 4. <i>G. tingens</i> . |

1. *Gymnema acuminatum* Wall.

A large climber. *Bark* corky. *Leaves* 3·5-6 by 1·8-2·5 in., ovate or ovate-elliptic, acuminate, glabrous above, tomentose beneath; lateral nerves 5-6 on either half; base rounded; petiole ·4-·8 in. long. *Cymes* subcapitate. *Calyx* segments ovate-acute. *Corolla* pale white, campanulate; lobes rounded, glabrous. *Style-apex* more or less conical. *Follicles* 3 by ·75 in., woody, beaked, cordate at base, tomentose (glabrous in *F. B. I.*) longitudinally ribbed; coma 1·5 in. long.

GOALPARA, SYLHET.

Flrs. 5. Fr. 11-1.

2. *Gymnema lactiferum* Br.

A climbing shrub; branches pubescent. *Leaves* 2·5-3 by ·75-1 in., ovate-oblong, elliptic or elliptic-lanceolate, acuminate, entire, subcoriaceous; glabrous; lateral nerves 3-4 on either half; base attenuate; petiole slender, ·3-·75 in. long. *Cymes*

axillary, pubescent; peduncles .25 in. *Flowers* .16 in. across. *Calyx* puberulous; segments round, ciliate. *Corolla* tube exceeding the calyx lobes, ovate, puberulous. The ridges of the corona more or less protruding from the mouth of the corolla. *Style* exceeding the stamens.

KHASI HILLS (Brandis—409).

Flrs. 5.

3. *Gymnema latifolium* Wall.

A twining shrub, pubescent. *Leaves* 2.5 by 1.5-2.5 in., suborbicular, usually acute, chartaceous, pubescent on the midrib above and nerves beneath; lateral nerves 5-7 on either half, prominent beneath; base rounded; petiole .5-.8 in. long, pubescent. *Flowers* in many flowered pedunculate binate umbellate cymes; peduncles stout, .3-.6 in. long; pedicels pubescent. *Calyx* segments pubescent, ovate-obtuse. *Corolla* lobes ciliate. *Follicles* about 3 in. long, punctate.

SIBSAGAR.

Flrs. 9. Fr. 12.

4. *Gymnema tingens* (Roxb.) Spr.=G. *tingens* W. & A.

A large twining shrub. *Bark* corky, furrowed on old stem; branchlets glabrescent. *Leaves* 2.5-6 by 1.5-3.5 in., elliptic-oblong or ovate, usually abruptly acuminate or caudate, membranous, glabrous when mature; lateral nerves 5-7 on either half; base usually with a tuft of glands at the junction with the petiole, cordate to truncate; petiole .6-2 in. long. *Flowers* pale yellow or cream-coloured, .3-.4 in. across in lax pubescent corymbiform racemose cymes; peduncles .5-.9 in. long; pedicels filiform, .5-.75 in. long. *Calyx* 5-partite, glandular within; segments pubescent outside. *Corolla* tube campanulate, pubescent within; lobes oblique. *Follicles* usually single, 4-6 by .4-.5 in., smooth with pointed tips and narrowed base. *Seeds* about .5 in. long, ovate, thin and margined; coma up to 2 in. long.

GOALPARA.

Flrs. 5. Fr. Cold season.

Pentasacme caudatum Wall.

A very slender tufted glabrous herb with rather woody stems. *Leaves* 2·3 by ·16·6 in., linear-lanceolate, caudate-acuminate, thin, bright green; nerves obscure. *Flowers* ·5 in. long, yellowish in axillary umbelliform cymes; pedicels filiform. *Calyx* 5-partite; segments subulate. *Corolla* tube short; lobes triangular, suddenly terminating in long filiform tails. *Corona* 4-fid. *Anther* tips membranous. *Stigma* included, obtuse. *Follicles* slender, terete, 2·5-3 in. long. *Seeds* ·1 in. long, reddish-brown, ovate.

KHASI HILLS, Patkoi Hills (U. Assam) upto 3,000 ft. (*F. B. I. IV.* 28).

Flrs. & Fr. 6-7.

P. Wallichii Wight.

Stouter stem. *Leaves* elliptic-lanceolate. *Flowers* much larger than above species with broader corolla lobes. *Stigma* beaked.

SYLHET, Mishmi Hills upto 3,500 ft. (*F. B. I. IV.* 28).

Flrs. 5-7. Fr. 8-10.

15. MARSDENIA Br.

Twinning shrubs or undershrubs, rarely erect. *Flowers* in simple or branched umbelliform cymes. *Calyx* 5-partite. *Corolla* campanulate, urceolate or salver-shaped; lobes spreading, narrow or broad, overlapping to the right. *Corona* processes membranous, hard or fleshy, adnate at the base to the staminal column, the apical portion free. *Staminal* column arising from or near to the base of the corolla; anthers with membranous tips; pollinia erect waxy, shortly pedicelled. *Style* apex flat, convex or depressed, beaked, sometimes elongated. *Follicles* 2 (more usually by abortion) lanceolate or poniard-shaped. *Seeds* comose.

Coronal scales usually longer:—

Corolla large, ·25 in. long or more :—

Style-tube short:—

Branches, petioles and leaves beneath tomentose:—

Cymes corymbose. Leaves 4-6 in. .. 1. *M. tenacissima*.

Branches, petioles and leaves glabrous or puberulous:—

Cymes subumbellate. Leaves 7-10 in. 2. *M. Jenkinšii*.

Style longer than the staminal column; apex bifid. Glabrous except the inflorescence. Flowers greenish yellow. .. 3. *M. Griffithii*.

Corolla small, less than .25 in. long :—

Follicles narrowed at the base, slightly
puberulous. Seeds narrowly ovoid. .. 4. *M. tinctoria*.

Follicles broad at the base with long
spreading hairs. Seeds broadly ovate. 5. *M. eriocarpa*.

Coronal scales very short, spurred. Stigma
fusiform. A powerful climber. 6. *M. thyrsiflora*.

1. Marsdenia tenacissima Wight & Arn. Vern. *Sunamarai*, Nep.

A large twining shrub; extremities, undersurface of leaves and inflorescence softly tomentose. *Leaves* 3-6 by 2-4 in., broadly ovate or orbicular, acuminate, subcoriaceous, velvety; basal nerves 5-7; base cordate; lobes rounded; petiole .5-.3 in. long. *Flowers* about .25 in. across, greenish yellow, in much branched corymbose cymes; peduncles intra-petiolar. *Calyx* segments pubescent, ovate-oblong, obtuse. *Corolla* pubescent outside, glabrous within; lobes reflexed with incurved margins. *Follicles* usually solitary, 4-6 by 1-1.4 in., longitudinally wrinkled, tip often recurved. *Seeds* broadly ovate, brown, margined, .6 by .3 in.; coma up to 2.5 in. long.

SYLHET, GOALPARA, NOWGONG.

The fibres are strong and are used for fishing lines, etc.

Flrs. 4-7. Fr. Cold season.

2. Marsdenia Jenkinsii Hook. f.

A glabrous or puberulous twining shrub; branches very stout. *Leaves* 7-10 by 5-7 in., broadly elliptic or orbicular, cuspidate, coriaceous, almost glabrous, pale beneath; lateral nerves 6-8 on either half, conspicuous; petiole 2-3 in. long. *Flowers* in sub-umbellate cymes. *Sepals* .5 in. long, lanceolate, pubescent. *Corolla* .75 in. across; tube globose; lobes villous within, glabrous without; coronal scales subulate or acute, much longer than the staminal column. *Style* tube short, conical. *Fruit* not seen.

(ASSAM, *Jenkins* (Herb. Royal Botanic Garden, Sibpur).)

3. Marsdenia Griffithii Hook. f.

A glabrous twinner. *Leaves* 3-7 by 1.5-3.5 in., elliptic, bluntly acuminate, coriaceous, glabrous, pale beneath; lateral

nerves slightly arched; base cordate or rounded; petiole 1.1-1.5 in. long. *Flowers* greenish-yellow in slightly purpureous, shortly penduncled corymbiform cymes. *Sepals* ciliate, half the length of the corolla. *Corolla* lobes slightly hairy within, glabrous without; coronal scales shorter than the orbicular anther tip. *Style* larger than the staminal column; apex bifid. *Fruit* not seen.

KHASI HILLS (upto 6,000 ft.) Myran, Griffith, H. f. & T.

4. *Marsdenia tinctoria* Br. Vern. Mei-ni-buli-likur, Khasi; Man-ri, Miri.

A stout tall climber, almost glabrous, extremities pubescent. *Leaves* 2-8 by .8-3 in.; ovate-acuminate, membranous (bluish when dry), finely pubescent when young, glabrous when mature; main nerves 7-8 on either half; midrib pubescent with a strong gland near the junction of the petiole; base more or less cordate; petiole .5-1.75 in. long. *Flowers* small in axillary densely flowered thyrsoid panicle. *Calyx-segments* ovate, pubescent externally. *Corolla* constricted at mouth. *Corona* process membranous, subulate, longer than the anthers. *Style* apex umbonate. *Follicle* 1, 3 by .5 in., narrow and tapering, tomentose; base oblique. *Seeds* .5 by .2 in.; coma 1.25 in. long.

GOALPARA, SIBSAGAR, LAKHIMPUR, KHASI & JAINTIA HILLS, N. E. FRONTIER TRACT.

Flrs. 9. Fr. 3.

5. *Marsdenia eriocarpa* Hook. f.

A tall climber, similar to *Marsdenia tinctoria* Br. *Corolla* much less than .25 in. long. *Follicles* shorter, broader at the base and turgid, villous with long spreading hairs; seeds broadly ovate.

SYLHET-Wallich. ASSAM-Masters.

6. *Marsdenia thyrsoflora* Hook. f.

A strong climber, almost glabrous. *Leaves* 4-8 by 2-6 in., broadly ovate or oblong, acuminate, membranous; base cordate; petiole 1-3 in. long. *Flowers* small in cymose

clusters arranged in racemes; rachis flexuous; pedicels very short. *Sepals* obtuse, almost glabrous. *Corolla* greenish or yellow, glabrous, .1-.15 in. long; lobes coriaceous, erect; coronal scales very short like spurs at the base of anther. *Stigma* fusiform. *Follicles* 2 in. long, coriaceous; base turgid; seeds ovate.

ASSAM—*Masters*.

Flrs. & Fr. 6-9.

16. **TELOSMA** Coville. (*Pergularia* F.B.I.)

***Telosma pallida* (Roxb.) Craib**=*Pergularia pallida* W. & A.

A large twining shrub. *Bark* corky when mature. *Leaves* 1.5-4 by .8-3.2 in., ovate-acuminate or acute, membranous, glabrescent or somewhat pubescent specially on the nerves beneath; lateral nerves 4-6 on either half; midrib glandular above at the base, cordate or sub-cordate; petiole .5-1.5 in. long. *Flowers* yellowish, .7-1.3 in. across on dense umbellate cymes. *Calyx* pubescent, deeply cleft; segments broadly subulate, ciliate. *Corolla* salver-shaped, deeply lobed, tube swollen; lobes linear-oblong, obtuse, overlapping to the right in bud. *Coronal* processes (staminal) arising from the base of the staminal column, flattened, each with a lamella from the inner face, which exceeds the stigma; style apex capitate. *Follicles* usually solitary, 2.5-4 by .7-1 in., bluntly beaked, smooth with a thin shell. *Seeds* .4 in., margined, comose.

KHASI HILLS.

Flrs. 6-8. Fr. Cold season.

17. **GONGRONEMA** Dcne.

***Gongronema nepalense* Dcne.**

A large twining shrub with thick milky juice; young shoots and inflorescence pubescent. *Leaves* 3-6 by 1.5-4 in., oblong, elliptic or ovate-acuminate, subcoriaceous, in maturity glabrous above, puberulous along the nerves beneath; lateral nerves about 7-9 on either half; base rounded or subcordate; petiole .5-2 in. long. *Flowers* yellowish, .25 in. across in axillary umbellate cymes branching into 3 divaricate arms;

peduncles 2-6 in. long, slender. *Calyx* 3-partite. *Corolla* campanulate, slightly overlapping to the right. *Coronal* scales usually absent. *Anther* tips inflexed, concealing the stigma; pollinia 1 in each cell, erect, waxy. *Stigma* clavate or conical. *Follicles* 2·5-3 by ·2-·3 in. *Seeds* ·3 in. long; coma fine silky white, about 1·2 in. long.

GOALPARA, SIBSAGAR, K. & J. HILLS (4,800 ft.).

Flrs. 8-9. Fr. Cold season.

Gongronema ventricosum Hook. f.

A glabrous twiner. *Leaves* 3 by 1·1-25 in., ovate or ovate-lanceolate, obtusely acuminate, coriaceous; lateral nerves 2-3 on either half, prominent beneath, arching within the margin; petioles stout, ·25-·3 in. long. *Flowers* in subsessile few-flowered cymes; pedicels short. *Calyx-segments* very small. *Corolla* ·3 in. long; tube glabrous within, lobes linear with recurved margins. *Coronal* scale recurved.

KHASI HILLS. (F. B. I. IV. 34).

18. DREGEA E. Meyer.

Wattakaka volubilis (L. f.) Stapf. in. Bot. Mag. Subtab 8976.-*Dregea* volubilis Benth. Vern. *Khamal-lota*, Ass.; *Soh-tyllai*, Khasi.

An extensive twining woody shrub; young parts tomentose; branches often postular. *Leaves* 2-5 by 1-3·3 in., ovate, acute or acuminate, subcoriaceous, softly pubescent with curled hairs, when young, becoming smoother with age; main lateral nerves 3-5 on either half, lower basal; base cuneate, rounded, truncate or less often cordate with a tuft of bristles at the junction with the petiole; petiole ·5-2 in. long. *Flowers* greenish, ·3-·5 in. across, in axillary or interpitiolar pubescent drooping umbellate cymes; peduncles slender, 1-3 in. long; pedicels ·5-1·5 in. long. *Calyx* about ·1 in. across, 5-partite; segments ovate-obtuse. *Corolla* green, cup-shaped, ultimately spreading; lobes ovate, obtuse, ciliate. *Corona* (staminal) processes, fleshy, glabrous with a short beak from the inner margin, bent towards stigma. *Pollinia* erect, waxy. *Style* apex dome-shaped. *Follicles* usually double, 3-4 by 1-1·2 in., velvety when young, divaricate, apex somewhat

blunt. *Seeds* 3-4, broad-ovate, margined; coma about 1·5 in. long.

KAMRUP.

Flrs. 4-6. Fr. Cold season.

19. TYLOPHORA Br.

Twining, rarely erect perennial herbs or undershrubs. *Flowers* small, often minute in simple or branched racemose, umbelliform or fascicled cymes. *Calyx* 5-partite, glandular with segments ovate or lanceolate. *Corolla* rotate or rotate-campanulate, deeply 1-lobed; lobes slightly overlapping to the right. *Staminal* corona processes adnate wholly or in part to the very short staminal column; anthers small with an inflexed membranous tip; pollinia 1 in each cell, erect or ascending, rarely transverse or pendulous from the stalk. *Style-apex* disciform, 5-gonal or 2-lobed. *Follicles* 2 (or by abortion 1), smooth, acuminate. *Seeds* flattened, margined; coma silky; cotyledons elliptic; radicle cylindric.

Branches and inflorescence glabrous.

Coronal processes globose without free points above. Calyx glabrous:—

- | | | | | | |
|--------------------------|----|----|----|----|-----------------------|
| Leaves 2-6 in. long. | .. | .. | .. | 1. | <i>T. longifolia.</i> |
| Leaves under 2 in. long. | .. | .. | .. | 2. | <i>T. tenuissima.</i> |

Branches and inflorescence more or less pubescent:—

Coronal processes without free tips above.

Calyx pubescent:—

- | | | | | | |
|-------------------|----|----|----|----|--------------------|
| Leaves glabrous. | .. | .. | .. | 3. | <i>T. exilis.</i> |
| Leaves tomentose. | .. | .. | .. | 4. | <i>T. hirsuta.</i> |

Coronal processes with free points. Leaves pubescent or tomentose; free points quite glabrous.

- | | | | | | |
|----|----|----|----|----|----------------------|
| .. | .. | .. | .. | 5. | <i>T. himalaica.</i> |
|----|----|----|----|----|----------------------|

1. *Tylophora longifolia* Wight.

A slender twiner. *Leaves* 2-6 by ·8-2 in., lanceolate, ovate-lanceolate or oblong-lanceolate, acuminate, membranous, glabrous; base acute, rounded or subcordate with a tuft of glands above at junction of the petiole; petiole slender, ·4-·8 in. long, channelled above. *Flowers* greenish in paniculate umbelliform cymes; pedicels filiform. *Calyx* glabrous. *Corolla* lobes 5-7-nerved. *Anthers* broad with short incurved appen-

dages. *Follicles* 2, divaricate at an angle of 90° up to 5 in. long, winged. *Seeds* oblong, truncate, crowned with a silky coma.

KHASI HILLS.

Flrs. 5. Fr. Cold season.

2. *Tylophora tenuissima* Roxb. *Wt. et Arn.* *T. tenuis* Blume.

A slender twiner, nodes of branches sparsely pubescent. *Leaves* variable, .6-1.9 by .3-.6 in., elliptic-ovate or oblong-lanceolate, acute or acuminate, glabrous; lateral nerves obscure; base acute or obtuse; petiole .1-.3 in. long. *Flowers* dark red in lateral paniced glabrous cymes; pedicels slender. *Bracts* lanceolate, subulate. *Calyx* glabrous; segments .04 in. long, acute, lanceolate. *Corolla* .16 in. across; lobes .06 in., ovate-oblong, glabrous, veined. *Corona* of 5 dark coloured; tubes adnate to the staminal column. *Follicles* yellowish-green, 2-3 in., apiculate, minutely striate; coma up to .9 in. long.

LAKHIMPUR (U. Kanjilal's No. 3278).

Flrs. 10. Fr. 6.

3. *Tylophora exilis* Coleb.

A slender twiner; branches puberulous at the nodes. *Leaves* 1.5-3.5 by 1.2 in., ovate-lanceolate or ovate-oblong, shortly acuminate, subcoriaceous, glabrous on both surfaces; lateral nerves 4-6 on either half with a tuft of minute glands at the junction of the petiole; base truncate, rounded or very shallowly cordate; petiole slender, .4-.8 in. long. *Flowers* very small in flexuous simple or branched umbellate cymes; pedicels slender. *Calyx* pubescent externally; segments ovate-acute. *Anther* appendages membranous; pollinia ovoid. *Style-apex* pentagonal, flat. *Follicles* 2.5-3.5 by .25 in., acuminate. *Seeds* .3 by .1 in., ovate, apex truncate; coma about 1 in. long.

SIBSAGAR, SYLHET, KHASI and JAINTIA HILLS (5,000 ft.)

Flrs. 9. Fr. 12.

4. *Tylophora hirsuta* Wall.

A rather stout twining shrub; stem densely clothed with soft spreading hairs. *Leaves* 1·3·5 by ·5·1·5 in., ovate or ovate-lanceolate, acute or acuminate, subcoriaceous, pubescent on both sides, specially hairy on the nerves; lateral nerves 4·5 on either half; base rounded, acute or sub-cordate; petiole ·5·1 in. long, tomentose. *Flowers* greenish, ·2··3 in. across, in few fld. villous umbellate cymes. *Calyx-segments* pubescent, lanceolate. *Corolla* about ·2 in. across, puberulous within. *Pollinia* horizontal. *Follicles* 2·2·5 by ·2··3 in., smooth. *Seeds* ·25 in. long, compressed, truncate; coma about 1 in. long.

CACHAR, KHASI HILLS (5,000 ft.).

Flrs. 5. Fr. Cold season.

5. *Tylophora himalaica* Hook. f. Vern. *Par-kol*, Ass.

A slender twiner, glabrous. *Leaves* 1·5·3·5 by ·5·1·5 in., ovate, lanceolate or elliptic-oblong, acuminate, membranous, glabrous; lateral nerves 5·7 on either half; base rounded or obtuse; petiole ·3··7 in. long. *Flowers* in paniced umbellate cymes, often 2 or more from the same axil. *Calyx segments* lanceolate. *Coronal* processes gibbous. *Follicles* 2, about 4·4·5 in., narrowly poniard-shaped. *Seeds* ·3 in. long, ovate; coma 1·75 in. long.

SIBSAGAR, KHASI HILLS.

Flrs. Rainy season. Fr. 11.

T. rotundifolia Ham.

A carious plant, herbaceous; stem pubescent, trailing flat along the ground; root-stock woody. *Leaves* 2·3·5 in. across, elliptic orbicular or broadly ovate, rounded or slightly acute, sometimes emarginate at apex, coriaceous, more or less pubescent; base rounded or cordate; petiole ·16··25 in. long. *Flowers* in many flowered sessile umbellate cymes; pedicels long, filiform. *Calyx-segments* lanceolate, hirsute. *Corolla* ·25··5 in. across; lobes ovate. *Coronal* process sub-globose (not pointed at apex). *Follicle* broadly fusiform, hard, about 2 in. long; seeds almost orbicular; coma caducous, 8 in. long.

ASSAM (Dangtota & Habra Ghat). (*F. B. I.* IV., 43).

Flrs. 5·7. Fr. 11·12.

T. asthmatica W. & A. Vern. *Ananthamul, Antomul*, Beng.

A much branching climber, usually pubescent, slender; roots fleshy. *Leaves* variable, 2-4 by 2 in., elliptic-oblong or ovate, apiculate, rather thickly coriaceous; nerves few, spreading; base rounded sometimes, petiole .3-.1 in. long. *Flowers* .6 in. across, dull, yellow-purple near the base in umbellate or racemose pedunculate, hairy cymes. *Calyx-segments* hispid. *Corolla* .3 in. across. *Coronal* processes forming a closed ring with large round free lobes at base; the apex with a finely acuminate point. *Follicle* lanceolate, sharp pointed, 2-4 in. long; seeds ovate.

ASSAM, CACHAR. (*F. B. I.* IV., 44).

The roots and leaves are used as a substitute for Ipecacuanha.

Flrs. 5-6. Fr. 8-9.

T. Belostemma Benth.

A softly hirsute twiner; hairs reflexed on stem. *Leaves* 1.5-2 in. long, ovate-cordate, acuminate, pale-green when dry, hirsute on both sides; petiole .5-.6 in. long. *Flowers* in few flowered umbelliform sub-sessile cymes; peduncles shorter than petioles. *Calyx-segments* lanceolate, hirsute. *Corolla* .25 in. across, purplish; lobes ovate, pubescent within. *Staminal column* contracted below the anthers. *Coronal* processes linear, radiating from the base of the column.

KHASI HILLS (Cherrapunjee and below), 2-4,000 ft. (*F. B. I.* IV., 43).

Flrs. 5-8.

20. TREUTLERA Hook. f.

Treutlera insignis Hook. f. Vern. *Meiktah*, Khasi.

A stout glabrous climbing shrub; stem strongly tubercled with milky sap, fibrous, silky white. *Leaves* 3-5.5 by 1.3-2.5 in., ovate-lanceolate, elliptic, elliptic-lanceolate, acuminate, coriaceous, glabrous; lateral nerves 4-6 on either half; base rounded or obtuse; petiole stout, .6-2 in. long. *Flowers* large in axillary simple, pedunculate umbels, sometimes one umbel-above another; peduncles 1-1.5 in. long; pedicels .5-1 in. long. *Calyx* glandular within; segments ciliate. *Corolla* coriaceous, purplish, rotate, glabrous, 1-1.5 in. across; lobes ciliolate, overlapping to the right. *Coronal* processes fleshy, connate to the back of the anthers. *Anthers* inflexed, rounded; pollinia solitary, waxy, erect, stalked. *Style-apex* hemispheric.

KHASI HILLS (U. Kanjilal's No. 5930).

Flrs. 8-9.

Cosmostigma racemosum Wight.

A stout climbing glabrous shrub. *Leaves* deciduous 3-4·5 by 1·5-3 in., rounded or ovate, acuminate, rather coriaceous; base sometimes cordately 2-lobed; petiole 1-2 in. long. *Flowers* greenish with brown dots, in axillary or lateral racemose cymes. *Calyx* 5-partite; segments ciliate; glands in pairs between the lobes. *Corolla* ·3 in. across, 5-fid, rotate; lobes slightly overlapping to the right. *Coronal* processes erect, membranous, adnate to the base of the staminal column. *Ovary* 2-carpelled; style thick. *Follicle* large, lanceolate, smooth, 7 by 1·5 in. in diameter; seeds ·6 in. long, ovate, margined, ending in a silky coma.

SYLHET. (*F. B. I.* IV., 46).

Flrs. 5-7.

21. DISCHIDIA Br.

Herbs or undershrubs, usually epiphytic, climbing and rooting on trees or pendulous from them, sometimes almost leafless. *Leaves* usually fleshy, sometimes converted into pitchers. *Flowers* very small or minute in axillary racemose or umbellate cymes or fascicles. *Calyx* small, 5-partite, membranous, glandular within scales. *Corolla* urceolate or campanulate, tubular; lobes 5, valvate. *Corona* (staminal) of 5 membranous processes adnate to the back of the staminal column, erect, tips entire, notched or 2-fid or with recurved arms. *Staminal* column very short; anther tips membranous; pollinia solitary in each cell, waxy. *Ovary* of 2 carpels; style apex flat or conical. *Fruit* of 2 small thick or slender, smooth, acuminate follicles. *Seeds* small; coma long.

Leaves partly or wholly converted into pitchers :—

Ordinary leaves ·5-1 in. diameter; pitcher

leaves 1·5-4 in. long. 1. *D. Rafflesiana*.

Leaves normal :—

Leaves ·3-·5 by ·2-·3 in.; petiole 0-05 in. long. 2. *D. Nummularia*.

Leaves ·5-1·8 by ·2-·4 in.; petiole 0-05 in. long. 3. *D. benghalensis*.

Leaves quite orbicular; petiole ·12-·25 in. long. 4. *D. khasiana*.

1. Dischidia Rafflesiana Wall. Vern. *Hankha-ojhar-mona*, Ass.; *Bandikuri*, Garo.

A creeping epiphytic undershrub with milky-juice rooting on the trunk and branches of trees and often pendulous

from their stem, almost glabrous. *Roots* incased in pouch-like cases. *Leaves* (ordinary) .5-1 in. in diam., orbicular; *Leaves* (modified pitchers) 1.5-4 by .8-1.5 in., oblong, ovate-oblong, fleshy, thick. *Flowers* yellowish. *Corolla* fleshy, urceolate. *Follicles* divaricate at an angle of 180° , 3 by .2 in. *Seeds* somewhat angled, about .1 in. long, winged; coma 1-1.5 in. long.

KAMRUP, NOWGONG, GARO HILLS.

The ants which live in the pitchers reciprocate by bringing fine earth to the rootlets which remain hidden inside the pitchers.

The rootlets are used as a medicine by Assamese Ojhas.

Fr. 4.

2. *Dischidia Nummularia* Br. Vern. *Thukura-khumal*, Kamp.

A slender epiphytic herb. *Leaves* .3-.5 by .2-.3 in., orbicular, convex on the upper surface, fleshy, coriaceous; petiole 0.05 in. long. *Flowers* whitish in 2-3 flowered clusters. *Lobes* of corona processes curved downwards, spathulate.

KAMRUP.

Flrs. 4. Fr. Cold season.

3. *Dischidia benghalensis* Coleb.

A fleshy epiphytic undershrub. *Leaves* .5-1.8 by .2-.4 in., fleshy, thick, narrow, oblong or spathulate; petiole 0.05 in. long. *Flowers* whitish in axillary clusters. *Lobes* of corona processes horizontal or up-curved.

SIBSAGAR, GOALPARA, N. C. HILLS.

Flrs. 5. Fr. Cold season.

4. *Dischidia khasiana* Hook. f.

A slender epiphytic creeper, almost glabrous. *Leaves* quite orbicular; petiole .12-.25 in. long.

KHASI HILLS.

22. HETEROSTEMMA W. & A.

Twining shrubs or undershrubs. *Leaves* usually with 3-5 basal nerves. *Flowers* small in lateral sessile or pedun-

culate umbellate or racemiform cymes; pedicels slender. *Calyx* 5-fid or partite. *Corolla* campanulate, urceolate or rotate; lobes veined, triangular, valvate. *Coronal* process of 5 lobes spreading more or less horizontally from the staminal column. *Staminal* column short, depressed; anthers minute; pollinia solitary in each cell, sessile, waxy, erect. *Style-apex* 5-angled, flat, not exserted beyond the anthers. *Follicles* slender, straight, terete; pericarp thin. *Seeds* winged, comose.

Branches hairy :—

- | | | |
|---|-------|--------------------------|
| Coronal process orbicular. | .. .. | 1. <i>H. Wallichii</i> . |
| Coronal process ovate-lanceolate, acuminate with a large appendage. | .. .. | 2. <i>H. alatum</i> . |
| Branches obscurely pubescent. Coronal processes stellately 5-lobed without appendage. | .. .. | 3. <i>H. stellatum</i> . |

1. *Heterostemma Wallichii* Wight.

A twining shrub; branchlets hairy chiefly along 2 lines. *Leaves* 3·6·5 by 1·5·3 in., ovate-oblong or elliptic, acuminate, subcoriaceous, glabrous; lateral nerves 4 on either half, conspicuous; base rounded or sub-cordate; petiole ·5·1·8 in. long. *Flowers* greenish, ·3··6 in. across in small cymes. *Coronal* processes orbicular. *Fruit* not seen.

ASSAM, NAGA HILLS, KHASI HILLS.

Flrs. 5-6.

2. *Heterostemma alatum* Wight.

A twining shrub; branches with two lines of hairs. *Leaves* 2·5·5 by ·8·3 in., ovate-elliptic, ovate or ovate-lanceolate, acuminate, subcoriaceous, glabrous; nerves winged beneath; rounded or acute; petiole ·5·2 in. *Flowers* yellowish; pedicels ·6··75 in. long. *Follicles* linear, 3·5·4·5 by ·2··25 in., divaricate at an angle of 175°-190°. *Seeds* ovate, ·6 by ·2 in., margined; coma about 2 in. long.

KHASI HILLS.

Flrs. Fr. 1.

3. *Heterostemma stellatum* Hook. f.

A twining shrub; branches rather pubescent. *Leaves* lanceolate or elliptic-lanceolate, acuminate; nerves beneath

winged with a conspicuous intramarginal nerve. *Coronal* process stellately 5-lobed, triangular-acute, without appendage.

(No specimen, *F.B.I.*, p. 47, Vol. IV).

23. HOYA Br.

Twining pendulous or rambling and rooting shrubs, sometimes epiphytic, rarely erect. *Leaves* usually thick and fleshy or coriaceous. *Flowers* in axillary, terminal or lateral umbelliform cymes. *Calyx* small, 5-partite with 5 glandular scales. *Corolla* rotate, fleshy or waxy; lobes 5, often convex or spreading or reflexed, valvate in bud. *Corona* of 5 fleshy membranous or horny processes adnate to the staminal column, stellately spreading or ascending, often concave on the upper surface; margins usually recurved so as to enclose a hollow space, the inner angle often produced into a tooth or spur, which is erect or incumbent on the anther. *Staminal* column short; anthers conniving over the stigma with a membranous appendage; pollinia erect waxy, solitary in each cell, pedicelled. *Ovary* of 2 distinct carpels; style-apex 5-angled, tip flattened or slightly apiculate. *Follicles* 1 or 2, usually slender, variable. *Seeds* small, ovate or oblong; coma long; cotyledons thick; radicle cylindric.

Hoya (after J. D. Hooker).

Corolla reflexed; lobes larger than broad:—

Collum stalked:—

Coronal process very long, erect with a long spur diverging from base of each:—

Umbels many flowered. 1. *H. multiflora*.

Collum sessile:—

Coronal process laterally compressed, semi-cordate, 2-winged:—

Umbels few flowered. 2. *H. acuminata*.

Corolla lobes spreading or recurved, broader than long:—

Collum sessile or sub-sessile:—

Coronal process stellately spreading; inner angle acute or produce into an erect or recurved spur:—

Inflorescence terminal or terminal and axillary:—

Leaves flat:—

- Umbels pedunculate:—
 Sepals oblong-lanceolate, pubescent. .. 3. *H. lanceolata*.
- Umbels sub-sessile:—
 Sepals ovate-lanceolate, glabrous. .. 4. *H. Lobbii*.
- Inflorescence axillary umbels:—
 Corolla .5 in. across or more; lobes spreading or incurved:—
 Leaves very small:—
 Leaves orbicular, .75 in. in diameter 5. *H. Nummularia*.
 Leaves elliptic, .5 in. long. .. 6. *H. vaccinioides*.
 Leaves very narrow; nerves almost obscure:—
 Leaves narrowly oblanceolate, 4-8 in. long. .. 7. *H. longifolia*.
 Corolla .5 in. across. .. 8. *H. oblanceolata*.
 Leaves broad, strongly 3-5 in. nerved:—
 Leaves ovate-elliptic 3-5 in. long:—
 Corolla .3 in. across. .. 9. *H. parasitica*.
 Leaves elliptic or linear-oblong, penninerved:—
 Nerves very horizontal:—
 Leaves linear-oblong 6-9 in. long:—
 Corolla brown, .3 in. across. .. 10. *H. fusca*.
 Nerves sometimes oblique:—
 Leaves narrow, oblanceolate, 6-9 in. long:—
 Corolla purple, 1.5 in. across. .. 11. *H. Griffithii*.
 Leaves orbicular, ovate-oblong or broadly elliptic, penninerved; nerves arching:—
 Leaves variable, 3-8 in. long:—
 Corolla cream-coloured, .75 in. across; lobes spreading .. 12. *H. Arnottiana*.
 Leaves elliptic or oblong .5-7 in. long:—
 Corolla cream-coloured .6 in. across; lobes incurved. .. 13. *H. globulosa*.
 Leaves ovate-oblong or oblong, 2-3 in. long.
 Corolla .5 in. across; lobes with fringed margin. .. 14. *H. Thomsoni*.

1. *Hoya multiflora* Blume.

An erect shrub, epiphytic. *Leaves* 4-9 by .9-2.5 in. oblong, oblanceolate, entire, acuminate, coriaceous, glabrous; lateral nerves 7-9 on either half, slender, arching; base cuneate; petiole .5-.8 in. long. *Flowers* in many flowered terminal or axillary umbellate cymes; peduncles 1.25-2 in.

long; pedicels slender, 1·8 in. long. *Calyx* segments, small, oblong. *Corolla* tube short; lobes triangular, ·5 in. long. deflexed, orange-coloured. *Corona* processes hairy. *Staminal* column stipitate. *Follicle* 7·8 in. long, slender. *Seed* narrow, winged; coma about 2 in. long.

(No specimen in the Forest Herbarium, Shillong).

NAGA HILLS (11,833 Watt).

Flrs. 3. Fr. 11.

2. *Hoya acuminata* Benth. Vern. *Tiw-reng-synreh*, Khasi.

Leaves 2·4 by ·8-1·4 in., elliptic-lanceolate, oblong-lanceolate, acuminate, entire, coriaceous, glabrous; nerves obscure; petiole ·1-·3 in. long. *Flowers* in umbellate cymes few flowered; peduncles ·4-·6 in., stout; pedicels slender, 1-1·25 in. *Follicles* not seen.

KHASI HILLS (3,000 ft.).

Flrs. 5-7.

3. *Hoya lanceolata* Wall.

A weak sub-epiphytic shrub. *Branches* long, pendulous; branchlets pubescent. *Leaves* 1-2 in. long, lanceolate or rhomboid-lanceolate, acuminate, fleshy, glabrous or sparsely puberulous on the midrib; midrib very obscure; base acute; petiole ·05-·1 in. long, hairy. *Flowers* in terminal and extra-axillary umbellate cymes; peduncles and pedicels stout, puberulous. *Calyx-segments* oblong, lanceolate, pubescent. *Corolla* lobes sub-triangular, puberulous within. *Corona* processes stellately spreading, fleshy. *Follicles* 5-6 in. long, slender. *Seeds* ·08 in.; coma 1-8 in.

(*F.B.I.* Vol. IV. P. 54).

ASSAM (King), LUSHAI HILLS (Mrs. Parry).

Flrs. 3-6. Fr. 8-1.

4. *Hoya Lobbii* Hook. f.

An epiphytic (found on *Carallia integerrima*). *Leaves* 2·5-3·6 by 1-1·6 in., ovate, ovate-elliptic, entire, acuminate, fleshy coriaceous, glabrous; lateral nerves 5-7 on either half,

- Umbels pedunculate:—
 Sepals oblong-lanceolate, pubescent. .. 3. *H. lanceolata*.
- Umbels sub-sessile:—
 Sepals ovate-lanceolate, glabrous. .. 4. *H. Lobbii*.
- Inflorescence axillary umbels:—
 Corolla .5 in. across or more; lobes spreading or incurved:—
 Leaves very small:—
 Leaves orbicular, .75 in. in diameter 5. *H. Nummularia*.
 Leaves elliptic, .5 in. long. .. 6. *H. vaccinioides*.
- Leaves very narrow; nerves almost obscure:—
 Leaves narrowly oblanceolate, 4-8 in. long. .. 7. *H. longifolia*.
 Corolla .5 in. across. .. 8. *H. oblanceolata*.
- Leaves broad, strongly 3-5 in. nerved:—
 Leaves ovate-elliptic 3-5 in. long:—
 Corolla .3 in. across. .. 9. *H. parasitica*.
- Leaves elliptic or linear-oblong, penninerved:—
 Nerves very horizontal:—
 Leaves linear-oblong 6-9 in. long:—
 Corolla brown, .3 in. across. .. 10. *H. fusca*.
- Nerves sometimes oblique:—
 Leaves narrow, oblanceolate, 6-9 in. long:—
 Corolla purple, 1.5 in. across. .. 11. *H. Griffithii*.
- Leaves orbicular, ovate-oblong or broadly elliptic, penninerved; nerves arching:—
 Leaves variable, 3-8 in. long:—
 Corolla cream-coloured, .75 in. across; lobes spreading .. 12. *H. Arnottiana*.
- Leaves elliptic or oblong .5-7 in. long:—
 Corolla cream-coloured .6 in. across; lobes incurved. .. 13. *H. globulosa*.
- Leaves ovate-oblong or oblong, 2-3 in. long.
 Corolla .5 in. across; lobes with fringed margin. .. 14. *H. Thomsoni*.

1. *Hoya multiflora* Blume.

An erect shrub, epiphytic. Leaves 4-9 by .9-2.5 in. oblong, oblanceolate, entire, acuminate, coriaceous, glabrous; lateral nerves 7-9 on either half, slender, arching; base cuneate; petiole .5-.8 in. long. Flowers in many flowered terminal or axillary umbellate cymes; peduncles 1.25-2 in.

long; pedicels slender, 1·8 in. long. *Calyx* segments, small, oblong. *Corolla* tube short; lobes triangular, ·5 in. long, deflexed, orange-coloured. *Corona* processes hairy. *Staminal* column stipitate. *Follicle* 7-8 in. long, slender. *Seed* narrow, winged; coma about 2 in. long.

(No specimen in the Forest Herbarium, Shillong).

NAGA HILLS (11,833 Watt).

Flrs. 3. Fr. 11.

2. *Hoya acuminata* Benth. Vern. *Tiw-reng-synreh*, Khasi.

Leaves 2-4 by ·8-1·4 in., elliptic-lanceolate, oblong-lanceolate, acuminate, entire, coriaceous, glabrous; nerves obscure; petiole ·1·3 in. long. *Flowers* in umbellate cymes few flowered; peduncles ·4·6 in., stout; pedicels slender, 1-1·25 in. *Follicles* not seen.

KHASI HILLS (3,000 ft.).

Flrs. 5-7.

3. *Hoya lanceolata* Wall.

A weak sub-epiphytic shrub. *Branches* long, pendulous; branchlets pubescent. *Leaves* 1-2 in. long, lanceolate or rhomboid-lanceolate, acuminate, fleshy, glabrous or sparsely puberulous on the midrib; midrib very obscure; base acute; petiole ·05-·1 in. long, hairy. *Flowers* in terminal and extra-axillary umbellate cymes; peduncles and pedicels stout, puberulous. *Calyx-segments* oblong, lanceolate, pubescent. *Corolla* lobes sub-triangular, puberulous within. *Corona* processes stellately spreading, fleshy. *Follicles* 5-6 in. long, slender. *Seeds* ·08 in.; coma 1-8 in.

(*F.B.I.* Vol. IV. P. 54).

ASSAM (King), LUSHAI HILLS (Mrs. Parry).

Flrs. 3-6. Fr. 8-1.

4. *Hoya Lobbii* Hook. f.

An epiphytic (found on *Carallia integerrima*). *Leaves* 2·5-3·6 by 1-1·6 in., ovate, ovate-elliptic, entire, acuminate, fleshy coriaceous, glabrous; lateral nerves 5-7 on either half,

faint, slender, arching; base shallow caudate, almost sessile. *Flowers* in terminal or axillary umbellate sub-sessile cymes. *Calyx* glabrous; segments ovate, lanceolate. *Corolla* hairy within, .5-.7 in. across; lobes subacute. *Coronal* processes ascending, thick, terete, obtuse and sub-acute, inner angle raised acute, as long as the anther tip (Hook). *Follicles* pendent, bluntly acuminate, about 6 by .25 in.; coma 1.6 in. long, cream or pale brown.

N. CACHAR, GARO HILLS, NOWGONG, KHASI HILLS (1,500 ft.).

Flrs. 8. Fr. 2-3.

5. *Hoya Nummularia* Dcne.

Stem slender, creeping and rooting at the nodes. *Leaves* .75 in. in diameter, orbicular, thinly fleshy, shining, glabrous, thinly reticulate; petiole slender, .25 in. long. *Flowers* in long peduncled umbellate cymes; peduncles about 2 in. *Calyx* segments ovate-oblong. *Corolla* .3 in. across, white pubescent (Griffith).

(No specimen in the Forest Herbarium, Shillong).
KHASI HILLS (Griffith).

6. *Hoya vaccinioides* Hook. f.

Quite glabrous. *Leaves* .5 in., elliptic, sub-acute, fleshy; nerves obscure. *Follicles* 3 in. long, slender, straight; pericarp thick.

UPPER ASSAM, Mishmi Hills (Griffith).

7. *Hoya longifolia* Wall.

A stout shrub with creeping and pendulous slender stem. *Branchlets* glabrous or sparsely pubescent. *Leaves* 2-6 by .5-1.5 in., narrowly lanceolate or oblanceolate or elliptic-acuminate, very fleshy, dull green, glabrous; nerves very obscure; petiole stout, .25-.8 in. long. *Flowers* .6-.7 in. across, slightly fragrant in umbellate cymes; peduncles up to 2 in. long, stout, glabrous. *Calyx-segments* ovate-acute, glabrous. *Corolla* lobes subtriangular, as broad as long, glabrous,

margins ciliate. *Coronal* process stellate, spreading, shining. *Follicles* 6-12 in. long. *Seeds* minute; coma about .5 in.

KHASI HILLS (5,000 ft. G. Mann).

Flrs. 6-8. Fr. 2.

8. *Hoya oblanceolata* Hk. f.

Stout climbing shrub. *Leaves* 4-6 in., narrowly oblanceolate-acuminate, entire, very fleshy. *Peduncle* .25-1 in. thick; pedicels slender, glabrous. *Calyx* segments ovate-acute. *Corolla* .5 in. across, pale, puberulous within. *Coronal* processes sub-erect.

No specimen in the Forest Herbarium, Shillong.

KHASI HILLS (4,000 ft.).

9. *Hoya parasitica* Wall.

An epiphytic creeping shrub (on *Vatica lanceæfolia*). *Branches* stout, glabrous, twining. *Leaves* 2-6 by .9-2.5 in., oblong-elliptic, ovate-elliptic or lanceolate, acute or acuminate, fleshy, glabrous, obscurely indistinctly nerved at the base; base rounded or obtuse; petiole thick, .2 in. long. *Flowers* waxy, white, faintly scented with a pink or purplish centre in densely umbellate cymes; peduncles stout, 1-3 in. long; pedicels slender, glabrous, .5-.8 in. long. *Calyx* oblong-obtuse. *Corolla* .3 in. across; lobes inflexed, glabrous, ovate-acute. *Corona* pinkish brown; lobes long, lanceolate-acute. *Follicles* 3-5 by .15 in., finely striate, glabrous. *Seed* minute, ovate; coma 1.2 in. long.

SIBSAGAR, GOALPARA, KAMRUP, GARO HILLS, KHASI HILLS (2,000 ft.).

Flrs. 3-4. Fr. 6-7.

10. *Hoya fusca* Wall.

An epiphytic fleshy creeping shrub. *Leaves* 6-9 by 1.2-2 in., oblong or elliptic-oblong, entire, acuminate, fleshy, glabrous, epidermis of lower surface quite plain and can be peeled off when the veins are quite conspicuously visible and horizontal; base obtuse; petiole stout, .5-.9 in. long. *Flowers* usually in axillary umbellate many flowered cymes; peduncles about 1 in. long; pedicels as long or slightly longer.

Calyx segments ovate, sub-acute, glabrous. *Corolla* about .5 in. across, pubescent within, lobes broadly ovate-acute. *Coronal* process short, very thick, obtuse, concave above, inner angle ending in an erect or recurved spur. *Follicle* straight, divaricate through an angle of 135° , 4-5 by .3 in., terete, tapering to the obtuse point, sometimes single. *Seeds* compound, ovate-acute, coma 1.9 in. long.

KHASI HILLS (5,200 ft.).

Flrs. 7. Fr. 12.

11. *Hoya Griffithii* Hook. f.

A large climbing shrub. *Leaves* 3.5-6 by .75-1.3 in., oblong or oblanceolate or elliptic-lanceolate, acuminate, coriaceous, glabrous, bright green above, pale beneath; nerves rather obtuse, nearly horizontal; base acute; petiole .5-1 in. long, stout; peduncles 2-4 in.; pedicels 1-1.5 in., very stout. *Calyx* segments green, spreading, .5 in. long, broad, oblong, obtuse, concave. *Corolla* about 1.5 in. across, pale purplish without, cream but with reddish tints inside; lobes broad, ovate-acute. *Corona* waxy white, processes elliptic with ascending subulate apices, the sides are perpendicular with the upper edge overlapping at the back and beneath at the base, with a V-shaped notch.

NOWGONG, KHASI HILLS (2,000 ft.).

Flrs. 7.

12. *Hoya Arnottiana* Wight.

A tall climbing shrub, quite glabrous. *Leaves* variable, 3-8 by 2-4 in., elliptic or lanceolate, acute or acuminate, coriaceous, glabrous; nerves conspicuous; petiole .5-1 in. long. *Peduncles* stout; pedicels about 1 in. *Calyx* segments broadly ovate-obtuse. *Corolla* glabrous within, .75 in. across, lobes spreading, sub-acute. *Coronal* processes large, exceeding the tube. *Follicle* 4-5 in.

No specimen in the Forest Herbarium, Shillong.
UPPER ASSAM, Sadiya (Griffith).

Flrs. 7. Fr. 3.

13. *Hoya globulosa* Hook. f.

A stout climber; stem woody. *Leaves* 5-7 by 2-3·5 in., elliptic or oblong, cuspidate or acuminate, coriaceous, hairy, midrib stout, nerves conspicuous and arching; base rounded; petiole ·5-1 in. long. *Peduncle* 3-4 in.; pedicels villous, 1 in. *Calyx* segments rounded. *Corolla* ·5 in. across, cream-coloured, almost glabrous within; lobes short, incurved. *Coronal* processes short, broadly elliptic, pink, concave above, inner angle produced into an erect spur, which is shorter than the large broad anther tips. *Follicles* 12-16 in. long, very slender, cylindric; pericarp thin. *Seeds* ·3 in., slender.

LAKHIMPUR, CACHAR.

Flrs. 3-5.

***H. teretifolia* Griff. Mss.**

A very singular plant, quite glabrous, slender, creeping and rooting. *Leaves* 5-7 in. long, slender, cylindric, quite terete.

UPPER ASSAM; Patkoi Hills, upto 4,000 ft. (*F. B. I.*, IV 54).

***H. polyneura* Hook. f.**

A quite glabrous plant; branches stout, long, flexuous. *Leaves* variable, 3-4 by 1-2·5 in., ovate or lanceolate, acuminate, very fleshy; midrib slender; nerves very close; base narrow or rounded. *Flowers* in very shortly peduncled axillary umbels. *Calyx* segments oblong-obtuse, glabrous. *Corolla* ·5 in. across, whitish; lobes papillose within. *Coronal* lobes red-purple, orbicular. *Follicles* 4 in. long, falcate, slender, smooth; seeds ovate-lanceolate.

Delai Valley (6,000 ft.). (*Kew. Bull.* 1934). (*F.B.I.*, IV. 54).

Flrs. 8. Fr. 10.

14. *Hoya Thomsoni* Hk. f.

A slender shrub, stem rooting. *Leaves* 2-3 by ·6-1·5 in., oblong or ovate-oblong, acuminate, thinly coriaceous, sparsely pilose beneath; midrib and nerves obscure; base rounded or obtuse; petiole ·25-·5 in. long. *Flowers* in short axillary umbellate cymes; peduncle ·5-1 in., pubescent; pedicels sparsely pubescent. *Calyx* segments ovate-acute, glabrous. *Corolla* ·5 in. across; lobe acute, margins ciliate. *Coronal* processes obovate with broad end outwards, concave

above with a boss, inner angle produced into a short erect spur.

KHASI HILLS 4,000 ft. (J.D.H. & T.T.) (*F.B.I.*, p. 61, Vol. IV).

24. CEROPEGIA Linn.

Perennial herbs, erect or twining, usually with a tuberous rootstock. *Flowers* often large, variously coloured, in axillary pedunculate umbellate or racemose cymes, rarely in pairs. *Calyx* 5-partite, glandular within. *Corolla* tubular, elongate, more or less inflated at the base; lobes 5, valvate, more or less connate at their tips. *Corona* double, arising from the staminal column, the outer annular or cup-shaped, entire or 5-10-toothed or 5-fid; lobes more or less adnate to the inner of 5 short or long processes opposite to the anthers and incumbent on them or erect, column short. *Anthers* short, erect, without appendages; pollinia erect, 1 in each cell, sub-sessile with one pellucid margin. *Ovary* of 2 carpels; style apex truncate or shortly conical. *Follicles* usually slender, smooth, acuminate. *Seeds* comose.

Branches and peduncles hairy. Petiole .25-.5 in. long. Corolla 1-2 in. or less, pale purple. . .	1. <i>C. angustifolia</i> .
Branches sparsely hairy or glabrate. Petiole 1-2 in. long. Corolla 2-2.5 in., lobes yellowish with purplish tips.	2. <i>C. pubescens</i> .
Branches glabrous. Petiole .25-.5 in. long. Corolla about 2 in. long, tips slightly dilated . .	3. <i>C. Arnottiana</i> .

1. *Ceropegia angustifolia* Wight.

An extensive slender twiner, pubescent or hairy. *Leaves* 2.5-7 by .3-.5 in., narrow-lanceolate, finely acuminate, sub-coriaceous, ciliolate, scabrid above, sparsely pubescent beneath; petiole .2-.5 in. long. *Peduncles* pubescent, up to 2 in. *Corolla* tube purplish, lobe tips green. *Corona* of 10 lanceolate ciliate lobes. *Follicles* 1.25 in. long.

KHASI HILLS 4,000 ft.

Flrs. 7. Fr. Cold season.

2. *Ceropegia pubescens* Wall.

A slender twiner, sparsely hairy. *Leaves* 1.5-5 by .5-2 in., ovate-acuminate, membranous, sparsely pubescent; base

ciliolate, rounded or cordate; petiole 1-2 in. long. *Peduncles* glabrous, 2-5 in. long. *Corona* of minute or obsolete lobes.

KHASI HILLS 4,000 ft.

Flrs. 8. Fr. Cold season.

3. *Ceropegia Arnottiana* Wight.

A slender almost glabrous creeper. *Leaves* 1·5-3 by ·3-1·3 in., oblong-lanceolate, long acuminate, chartaceous, ciliolate, puberulous above, glabrous beneath; base rounded or obtuse; petiole ·2-·7 in. long. *Peduncles* very short, very few flowered. *Corona* of 5 obtused bifid lobes.

KHASI HILLS 5,000 ft.

Flrs. 9. Fr. Cold season.

C. lucida Wall.

An extensive climber, quite glabrous. *Leaves* 4-7 by 1·5-3 in., ovate-lanceolate, membranous; petioles ·5-1·5 in. long. *Flowers* in short peduncled many flowered umbellate cymes. *Calyx* segments ·25-·3 in. long. *Corolla* 1·5-2 in. long, curved, green, spotted with purple; lobes linear with dilated and ciliate tips. *Coronal* processes linear-spathulate; lobes 10, short, triangular, ciliate.

KHASI HILLS (Tharia Ghat). CACHAR, SYLHET. (*F. B. I.*, IV. 73).

Flrs. 9-11.

FAM. 87. LOGANIACEÆ.

Trees, shrubs or herbs, sometimes climbing. *Leaves* opposite, simple, stipulate; stipules often very much reduced. *Flowers* small, white, usually regular, hermaphrodite, 4-5-merous, in terminal or axillary, simple or compound cymes, sub-capitate or paniced, rarely solitary; bracts and bracteoles present. *Calyx* inferior, small. *Corolla* lobes tubular, funnel-shaped or campanulate, imbricate or valvate or contorted. *Stamens* inserted on the corolla tube, alternate with the lobes; anthers 2-celled, introrse. *Ovary* free, 2-locular; style simple; stigma 2-fid or 2-partite; ovules 1 or more in each cell; placentas on the dissepiment or basal in the inner angle. *Fruit* a speticidal capsule or baccate, 1-many-seeded; albumen copious, fleshy or cartilaginous; embryo straight.

Ovary with many ovules in each cell:—

Herbs; flowers 5-merous, corolla lobes valvate; capsule didymous; cymes 2-3-chotomous. 1. **Mitreola.**

Trees or shrubs, often scandent:—

Corolla lobes imbricate. Fruit capsular, 2-valved:—

Style clavate. 2. **Buddleia.**

Style 4-fid at apex. 3. **Gelsemium.**

Corolla lobes valvate. Fruit baccate, indehiscent. Leaves tomentose, nerve reticulated. 4. **Strychnos.**

Corolla lobes contorted. Fruit indehiscent. Leaves succulent. 5. **Fagræa.**

Ovary with 1 ovule in each cell. Scandent shrub:—

Corolla sub-rotate. Anthers large, exserted. 6. **Gardneria.**

1. **Mitreola oldenlandioides Wall.**

An annual herb 6-18 ft. high. *Leaves* 1-3 by .3-1.2 in., ovate-oblong or elliptic-ovate, entire, acuminate, membranous, usually puberulous or almost glabrous; lateral nerves 8-10 on either half; base narrowed into the petiole .3 in. long; stipule reduced to a transverse line. *Flowers* 5-merous,

small, white, sessile or sub-sessile, axillary or terminal dichotomous cymes, often unilateral on the cyme branches. *Calyx*-segments glandular, sub-acute. *Corolla* lanceolate, lobe acute, valvate. *Ovary* 2-celled; ovules many in each cell on peltate placenta; style 2, short; stigma small, pilose, ultimately divergent. *Fruit* a lateral obcordate 2-horned capsule, recurved. *Seeds* obscurely angled, twice as long as broad.

KHASI & JAINTIA HILLS.

Flrs. & Fr. 10.

Mitrasacme nudicaulis Reinw.—A small annual herb is also recorded from KHASI HILLS, Nongkhlaw (4,000 ft.).

2. BUDDLEIA Linn.

Trees, shrubs or herbs, often tomentose. *Leaves* united by a stipulary line. *Flowers* 4-merous, in dense globose corymbiform cyme, axillary or in a terminal thyrsoïd panicle. *Calyx* campanulate. *Corolla* tubular or campanulate; anthers sub-sessile, ovate or oblong. *Ovary* 2-celled; style filiform; stigma capitate or clavate; ovules numerous in each cell, many seriate. *Capsule* septicidally 2-valved. *Seeds* very many, oblong or fusiform; testa adpressed or laxly reticulate, often expanded into a wing or tail; albumen fleshy; embryo straight.

Seeds not tailed:—

Flowers mauve in interrupted panicle of heads or clusters, tomentose, grey or tawny:—

Leaf base not narrowed into the petiole. .. 1. *B. paniculata*.

Flowers usually small, white, in cylindric spikes:—

Extremities and undersurface of leaves clothed with soft grey tomentum:—

Leaf base narrowed into the petiole. .. 2. *B. asiatica*.

Seeds tailed at both ends:—

Flowers middle-sized, white, tinged with pink and orange:—

Extremities and undersurface of leaves woolly with stellate hairs. 3. *B. macrostachya*.

1. *Buddleia paniculata* Wall.

A shrub with crooked stem; bark brownish grey, peeling off in long thin strips, extremities rusty-tomentose. *Leaves*

3-6 by 1-2 in., variable (lanceolate, oblong-lanceolate, ovate-oblong, elliptic-lanceolate, hastate) sinuate-dentate, crenate or sub-entire, acute or acuminate, membranous with deciduous tawny tomentum above, woolly beneath; lateral nerves slender, impressed above and indistinct, more prominent beneath; petiole .5-1.5 in. long; stipules reduced to a interpetiolar line. *Flowers* fragrant, sub-sessile in pedunculate heads of clusters forming an irregular panicle. *Calyx* .15-.2 in.; segments lanceolate, woolly outside, teeth short. *Corolla* pink and white, tomentose out-side, tubular, .3 in. long; lobes rounded, obtuse. *Capsule* ellipsoid, about .2 in. long.

NAGA HILLS, MANIPUR (5,000 ft.). (Mann's No. 203).

Flrs. 2-6.

2. *Buddleia asiatica* Lour. Vern. *Nuneheru-arong*, Mik.; *Dieng-lapane-dohkne*, *Dieng-srarrator*, Synt.; *Markong-abang*, Miri; *Uuneheru*, Mikir; *Agia-chita*, *Posutia*, *Bonchini*, Ass.; *Chi-riel*, Tipp. & Kuki.; *Khundamara*, Mech; *Sam-likphu*, Kach.; *Dieng-tuti-myneng*, Kh.

A pretty shrub 10-12 ft. high, often gregarious. *Bark* thin, grey with prominent vertical ridges and also separating in thin flakes; blaze greenish; extremities clothed with soft grey tomentum. *Leaves* 1.5-7 by .2-.3 in., narrow, lanceolate, acute, acuminate, minutely entire or serrulate, membranous, glabrous, dark green above, densely grey or white tomentose beneath; lateral nerves slender, 7-12 on either half; base narrowed into the petiole upto .3 in. long. *Flowers* small, white, odorous, sessile or subsessile in cymose clusters on the rhachis of spiciform panicles, these again often panicked (Haines) terminal or axillary; bracts deciduous. *Calyx* .05-.2 in., campanulate; teeth triangular. *Corolla* urceolate; lobes short, round, imbricate; anthers subsessile; stigma clavate. *Capsule* .2-.3 in. long, ellipsoid, valves bifid. *Seeds* minute, not tailed.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, DARRANG, KAMRUP, GOALPARA, NOWGONG, CACHAR, SYLHET, N. C. HILLS, KHASI & JAINTIA HILLS ascending upto 5,000 ft.

Flowers are eaten cooked with rats' meat by Syntengs. Used in killing fish by poisoning the water by smashed twigs and leaves by the Mikirs.

Flrs. 1-6. Fr. 4-11.

3. *Buddleia macrostachya* Benth. Vern. *Ja-long-kren*, *Dieng-jalan-kren*, Kh.

A large shrub or a small tree upto about 15 ft. in height. *Bark* corky, longitudinally furrowed, dark; blaze white, turning yellowish. *Young* shoots 4-winged, innovations and inflorescence, undersurface of leaves and petioles woolly with stellate hairs. *Leaves* 2·5-10 by ·8-2·5 in., lanceolate-acuminate or acute, serrate, subcoriaceous, upper-surface dark green, at first stellate pubescent, ultimately glabrate; nerves impressed above, prominent beneath, 12-19 on either side of midrib, mostly meeting in loops near the margin; base recurved, rugulose, tapering to the very short channelled petiole; petiole ·1-·3 in. long, often brownish tomentose; stipules prominent, upto ·15 in. broad, dark green, rugulose. *Flowers* rose purple, ·5-·6 in. long, in subsessile cymes arranged on dense terminal spikes 3-5 in. long, elongating in fruit to 9 in. *Upper* leaf axils with small congested spikes terminating in short shoots or peduncled clusters of cymes; pedicels elongated in fruit; bracts filiform, upto ·2 in. long. *Calyx* persistent, about ·2 in. long, woolly outside, campanulate, 4-lobed; segments erect, triangular-acuminate, apex infolded. *Corolla* ·4-·5 in. long, hypocrateriform, pubescent and purplish outside, orange within, tube dilated at the base, sparsely stellate hairy inside at the throat and the upper portion; lobes 4, rounded, short, ·1 in. long. *Stamens* 4, subsessile; anthers introrse, dorsifixed, dehiscing by slits. *Ovary* woolly, 2-celled; style glabrous, clavate, persisting in fruit; ovules numerous on 2-axile placentas. *Capsule* about ·3 in. long, tapering at the apex, pubescent, septically two-valved. *Seeds* small, tailed at both ends, upto about ·1 in. long.

KHASI HILLS above 4,000 ft.

Tomentum is usually grey at first, turns brown with age.

Flrs. 9-12. Fr. 4.

3. GELSEMIUM Benth.

Gelsemium elegans Benth.

A large woody evergreen glabrous climber; "bark corky; wood porous; vessels numerous, uniformly distributed" (Brandis). *Leaves* 1·5-4 by ·6-2 in., ovate, ovate-lanceolate, entire, acuminate, membranous, glabrous; lateral nerves about 6 on either half, rather obscure above, comparatively prominent beneath; base rounded, sometimes oblique; petiole ·1·5 in. long. *Flowers* golden yellow, regular, in axillary compound 3-chotomous cymes. *Calyx* segments acute, reddish, margins minutely ciliate. *Corolla* funnel-shaped, ·4·5 in. long; lobes obtuse, imbricate in bud. *Stamens* 5, inserted a little above the middle of the corolla tube; anther basifixed, somewhat sagittate. *Style* filiform; stigma 2-fid, each lobe is often split down the middle at the same height as the anthers. *Fruit* inflated, ·5 in. long, 2-celled. *Seeds* numerous, oblong.

KHASI HILLS, MANIPUR.

Root and leaves are very poisonous.

Flrs. & Fr. 1.

4. STRYCHNOS Linn.

Trees or scandent shrubs usually with short axillary clavate tendrils. *Leaves* opposite palmately or penninerved; stipules reduced to lines between petiole. *Flowers* 4-5-merous, in terminal or lateral bracteate cymes. *Calyx* small. *Corolla* salver-shaped, campanulate or rotate; lobes valate. *Stamens* inserted on the throats of the corolla; filaments short, filiform. *Ovary* 2-celled or 1-celled above; ovules many in each cell; stigma capitate or obscurely 2-lobed. *Fruit* baccate, usually globose with a hardened rind. *Seeds* 1-many, immersed in pulp, variously compressed or if solitary, globose; albumen copious, hairy; embryo short, cotyledons foliaceous; radicle terete, short.

Trees:—

Leaves large; corolla tubular, pilose inside:—

Leaves 5-nerved, gradually subacute, anthers non-apiculate:—

Seeds orbicular. 1. *S. Nux-vomica*.

Leaves 5-7 nerved, abruptly acute or acuminate; anthers apiculate:—

Seeds irregularly ovoid. 2. *S. Nux-blanda*.

Scandent or climbing shrubs:—

Leaves 3-nerved:—

Cymes axillary:—

Leaves ovate-lanceolate:—

Corolla lobes margins fimbriate. .. 3. *S. aenea*.

Cymes thyrsoïd, axillary, sometimes terminal:—

Leaves ovate:—

Corolla villous within:—

Anther cells slightly hairy:—

Ovary hairy. 4. *S. laurina*.

Leaves elliptic-oblong, suddenly caudate-acuminate:—

Corolla throat villous:—

Anthers glabrous:—

Ovary glabrous; style hairy. .. 5. *S. Wallichiana*.

1. *Strychnos Nux-vomica* Linn. Vern. *Makuri-kendu* or *Makurijab*, Ass.; *Kuchila*, *Thalkesur*, Beng.

A handsome middle sized or large tree. *Leaves* 3-6 by 2-4 in., broadly elliptic, ovate or sub-orbicular, obtuse or acute, coriaceous, glabrous, shining; basal nerves three strong and two slender ones from close to the base; base rounded or suddenly acute on the petiole; petiole .3-.5 in. long. *Flowers* white or greenish white, in short peduncled terminal cymes, many flowered. *Calyx* glandular, very small; teeth acute. *Corolla* tube white, cylindric, .3 in. long, slightly hairy near the base within; throat glabrous. *Style* filiform, glabrous; stigma entire. *Fruit* globose, yellow-orange, 2 in. across. *Seeds* discoid, satiny, .75 in. in diameter, surrounded by a bitter pulp.

Kanjilal's No. 7619 collected by B. Sen Gupta at Silghat-NOWGONG (planted?).

Contains two alkaloids, strychnine and brucine.

Flrs. 3-4. Fr. Cold season.

2. *Strychnos nux-blanda* A. W. Hill. Kew Bull., 1917, p. 189.

A small tree (45 ft. high); branches glabrous. *Leaves* 4.5-8.5 by 3.6-5 in., broadly ovate or elliptic, abruptly

acute or acuminate, glabrous, glossy on the upper side, 5-7 nerved, with nerves more or less prominent on the upper surface, but more conspicuous beneath, shaggy hirsute or glabrous; primary veins conspicuous; base rounded or roundish, cuneate or sometimes slightly cordate; petiole .4-.6 in. long. *Inflorescence* corymbose, paniced, sparsely flowered, .5-2.5 in. long, 1-1.5 in. broad; smaller branches axillary with 2-4 leaves at the apex; peduncles glabrous or sub-glabrous; pedicels papillose or minutely pubescent. *Calyx* segments narrow, elliptic-lanceolate, acute, .05-.1 in. long. *Corolla* white, .4-.5 in. long; lobes about .12 in. long, elliptic-lanceolate, slightly papillose; tube slightly hirsute. *Anthers* .06-1 in., apiculate, sub-sessile. *Ovary* glabrous; style .4-.5 in. long, glabrous. *Fruits* globose, 2.3-3.3 in. across; pericarp glossy, verrucose and woody, .06-.1 in. thick. *Seeds* 8-12, irregularly ovoid or more or less rounded, .7-.9 by .6-.8 in., sub-compressed.

MANIPUR (Kergalthan & Kaboo Valley, Watt No. 6628, 800 ft.).

Flrs. Rainy season. Fr. 1-2.

3. *Strychnos aenea* Var. *acuminata* A. W. Hill. Kew Bull., 1917, p. 138.

A scandent woody shrub. *Leaves* 3.5-4 by 1.5-1.7 in., more or less ovate, abruptly or gradually acuminate, chartaceous, bronze or copper coloured in the lower side, 3-nerved with 2 obscure pair at the base; nerves conspicuous, prominent on both sides, reticulate, cuneate or roundish beneath at the base; petiole small; tendrils bifurcate, glabrous. *Inflorescence* axillary, 1.2-1.4 in. long.

CACHAR, NAGA HILLS, KHASI HILLS (171 Prazer).
No specimen in the Forest Herbarium, Shillong.

4. *Strychnos laurina* Wall. Vern. *Hrui-khal*, Kuki; *Dukhonkha*, Garo; *Bogalata*, Ass.

An extensive climber, every part bitter; branches more or less angular, twisted. *Bark* brownish, shining. *Leaves* 3-6 by 1.25-3 in., ovate or elliptic, caudate-acuminate, sub-coriaceous, quite glabrous, 3-nerved; midrib more prominent

beneath; base rounded; petiole .2-.4 in. long, channelled above. *Flowers* numerous in large pubescent thyrsoid panicle; buds obovoid. *Calyx* segments blunt, ciliate. *Corolla* campanulate, tawny villous within; lobes about .1 in. long. *Stamens* inserted on the middle of the corolla tube. *Ovary* rounded, hairy, tapering into a conical style; stigma capitate. *Berry* globose, yellow when ripe, upto 2 in. in diameter (2 by 1.75 in.). *Seeds* velvety, flattened, brown, .75 by .6 in.

LAKHIMPUR, CACHAR, SYLHET & GARO HILLS.

Fruit used for worms, etc.

Flrs. 4. Fr. Cold season.

5. *Strychnos Wallichiana* Benth. Vern. *Thagwaman-rikang*, Mik.; *Gonsila-soukha*, Kach.

Large woody scandent shrub, whitish, plain, terete; tendril forked or 2. *Leaves* 2.5.5 by 1.2.2 in., elliptic-oblong, entire, caudate-acuminate, chartaceous, glabrous, glossy green (not bitter), prominently 3-nerved, often with 2 slender nerves along the margins; base rather rounded; petiole .1-.3 in. long. *Flowers* greenish, sweet-scented, in dense dichotomous compound corymbose cymes. *Corolla* tube cylindric, many times the length of the calyx, villous in the throat. *Anthers* glabrous. *Ovary* glabrous; style hairly. *Fruit* globose, slightly tapering at the apex, beaked, .5 in. in diameter, greenish white.

SIBSAGAR, GOALPARA, SYLHET, CACHAR, N. C. HILLS, MIKIR HILLS, KHASI & JAINTIA HILLS.

Flrs. 4. Fr. 9.

***S. quintuplinervis* A. W. Hill.**

A scandent or straggling shrub; stem, petiole and peduncle somewhat pubescent. *Leaves* 2.5.4 by 1.5.2.5 in., broadly ovate or ovate-lanceolate, acute or acuminate, glabrous, vernicose above; quintuplinerved; transverse veins distant; base rotundate or rotundately cuneate. *Inflorescence* axillary; corymbs multiflorous, .6-.8 in. long. *Calyx* segments triangular-ovate, acute, .04 in. long, ciliate at the margin. *Corolla* .16 in. long; lobes .06 in. long, ovate-acute. *Anthers* inserted inside the tube, .25-.3 in. long, much barbate towards the base.

Ovary glabrous, .75 in. long; one-ovuled; style glabrous. *Berry* ovoid, 1.1-2 in. long, smooth; pericarp crustaceous. *Seeds* .8 in. long.

KHASI AND JAINTIA HILLS. (Umsaw Forests, Shillong Herbarium No. 11075).

Flrs. 4-5. Fr. 7.

5. FAGRÆA Thunb.

Glabrous trees or shrubs, often epiphytic, sometimes scandent. *Leaves* opposite, usually entire, coriaceous; petiole dilated at the base, auriculate or united by a stipulary sheath. *Flowers* 5-merous, whitish or yellowish, rarely pink, supported by a pair of bracteoles, in bracteate terminal or axillary cymes, rarely solitary. *Calyx* segments thick, persistent in fruit, much imbricate. *Corolla* funnel-shaped; lobes twisted in bud, the right hand edge overlapping. *Filaments* filiform or slender; anthers oblong. *Ovary* 2-celled, throughout or 1-celled above; style filiform; stigma capitate; ovules numerous in each cell. *Berry* 1-2-celled. *Seeds* immersed in pulp; tests crustaceous; albumen horny; embryo small, straight.

Corolla lobes 1.1-5 in. long:—

Fruit 1.1-5 in. long.	..	..	..	1.	<i>F. obovata.</i>
Fruit .6-.75 in. long.	..	..	..	2.	<i>F. khasiana.</i>

1. *Fagræa obovata* Wall. Vern. *Dieng-thiang*, Kh.; *Dieng-sarynkho*, Synt.

A small tree or shrub, often epiphytic, throwing out roots like a *Ficus* and clasping the stem with the annual roots; bark blackish and rough outside, fleshy, .6 in. thick, uniformly light dun inside. *Leaves* 3-6 by 1-3 in., ovate-oblong or elliptic, entire, shortly and abruptly acuminate, coriaceous (terminal leaves fleshy), glabrous above, velvety tomentose beneath; lateral nerves obscure; midrib more prominent beneath; base cuneate; petiole .2-.8 in. long; stipules more or less adnate to the petiole. *Flowers* white or cream coloured, 3 in. long in small terminal cymes; pedicels very short; bracts ovate or oblong, thick. *Calyx* segments thick, oblong-obtuse. *Corolla* upper half campanulate; lobes elliptic, obtuse, about 1.5 by 1 in., throat of

corolla transversely wrinkled inside. *Filaments* very slender; anthers large. *Berry* shining, slaty green, black when ripe, 1.1.5 in. long.

CACHAR, GARO HILLS, KHASI & JAINTIA HILLS ascending upto 5,000 ft.

Flrs. 7. Fr. Cold season.

Var. Gardneri Thw.—Leaves 2.7.5 by .8.2.2 in.; petiole .2.8 in. long.

2. *Fagræa khasiana Benth.*

A middle sized tree (independent). *Bark* grey with faint vertical reticulating ridges. *Leaves* 3.8 by 2.3.8 in., elongate-elliptic or oblong-elliptic, entire, acuminate (drying light cinnamon colour and rugose) coriaceous, glabrous; lateral nerves very slender, about 10 on either half; base cuneate; petiole 1.1.5 in. long; stipules adnate (old leaves yellow). *Flowers* in terminal compound cymes; bracteoles thick, linear-lanceolate, acuminate. *Calyx* cleft about $\frac{1}{3}$ way down; segments obtuse, about .3 in. long. *Corolla* funnel-shaped, 1.25 in. long; lobes about .5 in. long. *Fruit* .6.75 in. long.

KHASI & JAINTIA HILLS upto 4,000 ft.

Flrs. 3.4. Fr. 7.9.

6. GARDNERIA Wall.

Large glabrous scandent or climbing shrubs. *Leaves* opposite, entire; petioles connected by a stipulary line. *Flowers* solitary or in pedunculate axillary cymes. *Calyx* small, deeply 4-5-partite. *Corolla* subrotate; lobes 4.5, thick, valvate in bud. *Stamens* 4.5, inserted on the corolla tube; filaments short; anthers sub-sessile; cells ovate, connivent or sub connate. *Ovary* 2-celled; style cylindric; stigma shortly 2-lobed; ovules usually 1 in each cell. *Berry* globose, usually 2-seeded; pericarp fleshy; albumen fleshy; embryo small; radicle inferior.

A large woody spirally twining climber:—

Flowers in dense 3-chotomous cymes:—

Leaves acute.

..

..

..

1. *G. ovata.*

A scandent shrub, about 6-8 ft.:—

Flowers solitary in nodding peduncle :—

Leaves acuminate. 2. *G. angustifolia*.

1. Gardneria ovata Wall. Vern. *Mei-sinji-ong*, Kh.

A large woody climber; bark black, thin, plain; blaze yellowish green; stem spirally twinning. *Leaves* 2-5 by 1-2 in., elliptic or ovate-lanceolate, entire, acute, thinly coriaceous, glabrous; lateral nerves very slender, rather obscure above. *Flowers* greenish-yellow in pedunculate trichotomous cymes; bracteoles .2-.3 in. long. *Calyx* segments rounded. *Corolla* lobes about .2 in. long. *Anthers* connate on the lower portion. *Berry* scarlet, .3 in. in diameter.

KHASI HILLS, ascending upto 2,000 ft.

Flrs. 4-6. Fr. Cold season.

2. Gardneria angustifolia Wall.

A large scandent shrub. *Leaves* 2-4 by .6-1.2 in., lanceolate, entire, acuminate, chartaceous, glabrous; lateral nerves rather obscure, 6-9 on either half; base acute or rounded; petiole .2-.3 in. long. *Flowers* about .5 in. across, solitary on nodding filiform axillary peduncles (.4-1 in. long). *Calyx* .15-.2 in. long; segments triangular. *Corolla* lobes .2 in. long, villous or glabrate within. *Anthers* subsessile, sub-connate; cells ovate. *Berry* scarlet, .3-.4 in. in diameter.

KHASI HILLS (Brandis).

Flrs. 5-7. Fr. Cold season.

FAM. 88. GENTIANACEÆ.

Mostly herbs (often perennial), rarely shrubs, usually bitter and glabrous. *Leaves* usually opposite, entire, exstipulate. *Flowers* usually regular, hermaphrodite, 4-5-merous, in bracteate cymes or clusters, rarely solitary. *Calyx* inferior; segments imbricate in bud. *Corolla* campanulate, funnel-shaped or salver-shaped; lobes twisted to the right, rarely imbricate or induplicate-valvate. *Stamens* alternate with the corolla lobes, epipetalous; filaments linear, sometimes dilated below; anthers usually introrse, dehiscing longitudinally or by apical pores. *Disc* 0, annular or of 5 glands. *Ovary* superior, usually 1-celled, placenta usually parietal, occasionally the ovary is 2-celled with axile placenta; ovules usually numerous, anatropous; style simple; stigma simple or 2-lobed. *Fruit* usually a septicidal capsule, rarely baccate. *Seeds* numerous, small, sometimes winged; albumen abundant; embryo small.

I. Terrestrial herbs; leaves opposite :—

A. Flowers regular :—

Ovary 2-celled; style filiform :—

Flowers blue, purple or white. .. 1. **Exacum.**

B. Flowers irregular; style filiform;

stigmas 2. 2. **Canscora.**

Ovary 1-celled; style short or 0 :—

Corolla lobes without pits depressions or spurs at the base :—

Erect herbs :—

Corolla tubular campanulate :—

Flowers usually blue. .. 3. **Gentiana.**

II. Twiners :—

Corolla tubular-campanulate :—

Stamens attached to the tube. .. 4. **Crawfurdia.**

Corolla lobes with depressions or spurs at the base :—

Corolla lobes with 1-2 glandular nectaries. 5. **Swertia.**

III. Aquatic plants :—

Leaves alternate or sub-opposite :—

Corolla-lobes induplicate-valvate. .. 6. **Limnanthemum.**

1. EXACUM Linn.

Exacum tetragonum Roxb. Vern. *Sher-ri-takti*, Kh. (=chireta of damp places).

An erect herb; stem 1-6 ft., quadrangular. *Leaves* 2-5 by $\cdot 5$ -1 in., decussate, sessile, lanceolate-acuminate, entire, membranous, glabrous, 3-5-nerved. *Flowers* azure blue, 4-merous (rarely 1) in many flowered panicles; bracts upto $\cdot 5$ in. long, narrowly lanceolate or linear. *Calyx* keeled, almost winged. *Corolla* lobes $\cdot 75$ in. long, ovate-acute; anthers yellow, $\cdot 3$ in. long, erect. *Capsule* subglobose or ellipsoid, $\cdot 3$ in. in diameter.

N.-E. F. TRACT, DARRANG, KAMRUP, KHASI and JAINTIA HILLS, upto 4,500 ft.

The plant is used as a tonic in fever and as a stomachic, bitter (Pharmacopœia Indica).

Flrs. 5-7. Fr. Cold season.

E. teres Wall., also is recorded from KAMRUP.

2. CANSCORA Lamk.

Canscora andrographioides Griff.

A weed, as an under-growth in Hollong-Makai-Nahor forest. *Branches* quadrangular. *Leaves* $\cdot 7$ -2 by $\cdot 3$ - $\cdot 6$ in., 3-5-nerved, hastate or lanceolate, acuminate, entire; petiole $\cdot 1$ in. long. *Flowers* in axillary few flowered cymes. *Corolla* lobes obovate, obtuse, veined. *Capsule* oblong, nearly as long as the calyx.

LAKHIMPUR (Jeypore reserve), KHASI & JAINTIA HILLS, upto 4,000 ft.

Flrs. 2. Fr. Rainy season.

Canscora decussata Roem.

An erect herb 6-20 ft.; stem with 4-winged branches. *Leaves* $\cdot 5$ -1 by $\cdot 2$ - $\cdot 3$ in., 3-nerved, sessile, lanceolate-ovate or oblong-lanceolate. *Flowers* irregular, sub-labiate, white in lax cymes. *Calyx* 4-winged. *Corolla* lobes obovate; tube as long as the calyx. *Stamens* 1 perfect, conspicuously larger than the others. *Capsule* oblong. *Seeds* brown.

GARO HILLS.

The plant is regarded as a laxative, alterative and tonic, and is much praised as a nervine tonic. (Dutt).

Flrs. & Fr. Cold weather.

3. GENTIANA Linn.

Glabrous or nearly glabrous annual or perennial herbs, mostly of tufted growth. *Flowers* blue yellow or white. *Inflorescence* axillary or terminal. *Calyx* tubular, rarely keeled; segments 4-5. *Corolla* tubular, campanulate or funnel-shaped; lobes 4-5, often with folds between the lobes. *Stamens* 4 or 5, included; filaments linear, somewhat flattened below; anthers oblong or ovate. *Ovary* 1-celled; ovules many; style usually short; stigma bilobed. *Capsule* sessile or stalked, oblong or ellipsoid.

Nearly all the species of the genus are more or less bitter (stem and root) and many are of great medicinal importance and value.

G. lutea Linn, yields the real *Gentiana root*.

1. *Gentiana tenella* Fries. Var. *sikkimensis* clarke.

A delicate erect diffuse herb. *Leaves* .3-.6 by .1-.3 in. *Flowers* 5-merous. *Calyx* bell shaped. *Corolla* dirty violet, 5-lobed; stigma foliaceous. *Capsule* sessile, about .6 in. long.

KHASI and JAINTIA HILLS, 5,500 ft.

Used in Lahoal as a decoction for fever (Ailderson).

Flrs. 7-8. Fr. Cold season.

2. *Gentiana quadrifaria* Bl.=*G. pedicelleta* Wall (in part).

An erect herb. *Leaves* .2-1 by .1-.4 in.; radical leaves rosulate, yellowish green. *Flowers* blue, .3 in. long, in terminal cymes. *Capsule* stalked, ovoid or ellipsoid.

KHASI and JAINTIA HILLS.

4. CRAWFURDIA Wall.

Crawfurdia campanulacea Wall. Modern name *Gentiana campanulacea* (Wall and Griff.) nov. comb.

A twiner. *Leaves* 1.5-3 by 1-1.5 in., opposite, elliptic-acuminate, entire, minutely denticulate, rather membranous,

glabrous, margins recurved, 3-nerved; nerves impressed above, strong beneath; petiole channelled, .1-.2 in. long. *Flowers* axillary; peduncles 1-flowered, one long (4.5 in.) and another short (.25-.75 in.) of the same pair, the longer one flowering much earlier. *Calyx* tube long, conical, .75 in. long, 5-angled; lobes ovate-acuminate, green, recurved, spreading, about .1 in. below the truncate end of the tube, .5 by .25 in. *Corolla* purple, about 2 in. long, pitcher-shaped, distinctly plicate; tube 1.5 in. long; lobes deltoid with horizontal sinuses as wide as the width of the lobes. *Filaments* dilated. *Stigma* curled, black. *Disc* 5-glandular. *Capsule* about 1 by .2 in., terete. *Seeds* discoid, winged, all round.

KHASI HILLS, upto 6,000 ft.

Flrs. & Fr. Cold season.

Crawfurdia fasciculata Wall. Modern name *Gentiana fascicularis* Marq. Kew. Bull., 1931: 70; 1937: 156; also occurs in KHASI HILLS.

5. SWERTIA Linn.

Annual or perennial herbs. *Leaves* usually opposite. *Flowers* 4-5-merous, blue, lurid or white, regular, sometimes with yellow nectaries, in terminal corymbose or paniced cymes. *Calyx* segments lanceolate, acute. *Corolla* rotate; lobes twisted to the right in bud, each having 1 or a pair of glandular nectaries at the base. *Stamens* free or slightly joined in a ring; filaments often more or less dilated; anthers versatile. *Ovary* 1-celled; the placentas slightly intruded; style short or 0; stigmas bilobed; ovules many. *Capsule* sessile, 2-valved, ovoid or oblong. *Seeds* many, minute, often winged, reticulate.

Flowers 5-merous :—

One gland on each corolla lobe, much reflexed, red-purple or dark-red. 1. *S. purpurascens*.

Flowers 4-merous :—

Corolla green, variously tinged:—

2-glands on each corolla lobe. 2. *S. Chirata*.

Corolla pale-blue with darker veins :—

One small orbicular gland on the base. 3. *S. pulchella*.

1. *Swertia purpurascens* Wall. Vern. *Chireta*, Beng. & Kh.

A small annual herb. *Leaves* .5-1 by .1-.3 in. *Panicle* many flowered. *Capsules* stalkless. *Seeds* minute, globose, yellowish when mature.

KHASI HILLS, 6,000 ft.

Flrs. 8-9. Fr. Cold season.

2. *Swertia Chirata* Ham. Vern. *Chireta*, Beng. & Kh.; *Kirata-tikta*, Sans.

A perennial herb, with rooting stem. *Leaves* 1-3 by .6-1.3 in., sessile, 5-nerved.

KHASI HILLS, 6,000 ft.

The drug obtained from the dried plant is held in high esteem for its medicinal properties as a tonic, febrifuge and anthelmintic. It is a bitter tonic administered in the form of infusion or tincture and now official in British Pharmacopœia.

Other species mentioned above are used as substitute for *S. Chirata* (true *Chireta*).

Flrs. 9-10. Fr. Cold season.

3. *Swertia pulchella* Ham. Vern. *Chireta*, Beng. & Kh.

A small herb. *Leaves* .3-1.3 by .1-.6 in., sessile, 3-nerved.

KHASI HILLS, 6,000 ft.

Flrs. 8-9. Fr. Cold season.

***S. cordata* Wall.**

A small annual herb upto 3 ft. high. *Leaves* .6-1 by .4-.7 in., ovate-acute, often cordate, 3-5-nerved, sessile. *Flowers* in many flowered panicles. *Corolla* yellowish-white; margins streaked purplish. *Filaments* linear, free. *Style* cylindric; stigma almost hemispheric.

KHASI and JAINTIA HILLS, 3-5,000 ft.

***S. dilatata* Clarke.**

A glabrous herb, about 30 in. high; stem obscurely lineolate. *Leaves* sessile, about 2 in. long, linear-lanceolate, glabrous. *Flowers* in thyrsoid panicles. *Calyx* lobes narrow, lanceolate-acuminate, .3 in.

long. *Corolla* yellowish. *Filaments* dilated (not connate at base); capsule oblong-ovoid, .4-.5 in. long.

KHASI and JAINTIA HILLS (3,000 ft.).

Flrs. & Fr. Cold season.

S. paniculata *Wall.*

A herb resembling *Swertia purpurascens* *Wall.* *Leaves* oblong or lanceolate, 1-3-nerved. *Calyx* segments .2 in. long, acute. *Corolla* lobes ovate-acute, .25 in. long. *Filaments* linear, separately inserted on the corolla tube. *Style* long; stigma linear. *Capsule* .3 in. long, acuminate.

ASSAM (Kew Bulletin, 1932).

S. macrosperma *Clarke.*

A herb; stem quadrangular. *Leaves* sub-sessile, 1.75 by .3 in., oblong or sub-ovate, acute. *Corolla* lobes .75 in. long, biglandular near the base, lanceolate. *Filaments* linear; anthers hastate. *Stigmas* sub-sessile. *Capsule* .3 by .16 in. *Seeds* few, smooth, ellipsoid.

KHASI HILLS (4-6,000 ft.)

Flrs. & Fr. 7-11.

S. nervosa *Wall.*

A herb; stem 4-lineolate or 4-winged. *Leaves* 1.5 by .6 in., elliptic-lanceolate, 3-nerved; base narrowed. *Panicles* many flowered. *Calyx* segments oblong-linear, .6 in. long. *Corolla* lobes ovate-acute with one orbicular gland at the base. *Filaments* linear. *Stigma* sub-sessile, hemispheric. *Capsule* .3 in. long, ovate.

ASSAM (Kew Bulletin, 1932).

Flrs. & Fr. 8-11.

S. Lacei *Craib.*

An erect herb. *Leaves* 1.5 in. long, se-sile, linear, mucronulate, rigid, recurved; lateral nerves almost obscure. *Cymes* many flowered. *Calyx* segments 4, .2 in. long, linear-lanceolate, acute. *Corolla* tube short; lobes .3 in. long, elliptic or obovate-elliptic, obtuse. *Filaments* .12 in. long, slightly dilated; anthers .05 in. long. *Pistil* .16 in., glabrous.

NAGA HILLS.

6. LIMNANTHEMUM S. P. Gmel.

Limnanthemum cristatum *Griseb.*

An aquatic herb. *Stem* rooting at the nodes, petiole-like. *Leaves* 1.5-4 in. across, orbicular, floating, deeply

cordate; petiole upto 2 in. long. *Flowers* dimorphic in dense clusters. *Corolla* lobes glabrous with a longitudinal crest down the middle. *Capsule* sub-globose. *Seeds* barbed or prominently tubercled.

ASSAM, North Trunk Road (54th mile).

Flrs. 4-5. Fr. Autumn.

FAM. 89. POLEMONIACEÆ.

Herbs or shrubs, sometimes scandent, often glandular. *Leaves* usually exstipulate. *Flowers* regular or slightly zygomorphic, hermaphrodite, 5-merous, usually in cymes (sometimes condensed into involucrate heads). *Calyx* inferior; segments valvate or imbricate, persistent. *Corolla* variously shaped; lobes twisted in bud. *Stamens* epipetalous, alternate with the corolla lobes. *Ovary* 3-celled (rarely 2-5), situated on a disc; style simple, more or less lobed at the tip; ovules 1-many in each cell, sessile, anatropous. *Fruit* usually a loculicidal capsule. *Seeds* albuminous; embryo straight.

***Cobæa scandens* Cav.**

A large climber with perennial leaves. *Leaf* rachis terminating in a branched tendril for climbing. *Flowers* green to pale yellow and large, more or less zygomorphic. *Corolla* campanulate; bracts large, cordate, purple; nectary with a large quantity of thin honey.

Cultivated in Shillong garden. Ornamental climber of rapid growth.

Flrs. 11.

***Phlox drummendi* Hook.** A well-known garden plant cultivated throughout India.

FAM. 90. HYDROPHYLLACEÆ. (By C. B. Clarke).

Herbs, rarely undershrubs, usually hairy, sometimes glandular hairy. *Leaves* simple or compound, exstipulate, usually alternate, rarely opposite. *Flowers* bisexual, regular, usually 5-merous. *Inflorescence* various. *Calyx* inferior; segments imbricate. *Corolla* usually rotate; lobes usually imbricate. *Stamens* on the corolla tube and alternate with the lobes; filaments often hairy with scale-like appendages at the base. *Ovary* superior, bi-carpillary (1-2-celled); style 1-2; stigma capitate; ovules 2-many in each cell, sessile or pendulous, anatropous. *Fruit* usually a loculicidal capsule; albumen rich. *Seeds* minute; embryo small.

(Honey is secreted below the ovary and protected by the appendages of the stamens).

Hydrolea zeylanica Vahl.

A swamp weed making a matted covering often found in rice fields. *Leaves* about 4 by 1 in., lanceolate-acuminate, upper gradually smaller, sessile or shortly petioled. *Flowers* deep bluish purple, solitary or in cymes. *Calyx* deeply 5-partite, patently hairy, the thicker hairs glandular. *Corolla* rotate, bright bluish purple with a greenish white centre; lobes broadly ovate. *Filaments* dilated at base; anthers versatile; style 2, wide apart. *Seeds* numerous, oblong, on large fleshy central placenta; pericarp membranous.

SIBSAGAR, LAKHIMPUR, KHASI & JAINTIA HILLS.

Flrs. 11-12. Fr. Hot weather.

FAM. 91. BORAGINACEÆ.

Herbs, shrubs or trees, very rarely climber, often with cystoliths or hispid hairs. *Leaves* usually alternate, exstipulate. *Flowers* usually 5-merous, regular, hermaphrodite, rarely polygamous, normally in dichotomous or scorpioid cymose or 3-chotomous panicles. *Calyx* inferior, usually persistent and often accrescent in fruit. *Corolla* often with scales in the throat, imbricate (rarely twisted) in bud. *Stamens* epipetalous, alternate to corolla lobes; anthers introrse. *Disc* often present, annular, hypogynous. *Ovary* superior, of 2 median carpels, 2-celled, but soon usually 4-celled by false septa; ovules sub-erect from the inner angles of each cell, 2 in each cell (2-celled) or 1 in each cell (4-celled); style terminal or gynobasic, simple or forked; stigma capitate or 2-lobed. *Fruit* drupaceous or of 2-4 achenes or nutlets. *Seeds* straight or curved; albumen scanty; embryo straight or curved; cotyledons flat, planoconvex; radicle superior.

Ovary entire. Fruit drupaceous (1-4-celled):—

Style terminal, twice bilobed :—

Calyx teeth short, irregular, accrescent in fruit :—

Trees or shrubs. **1. Cordia.**

Style simple, once bilobed or climbed to the base or entire (no ring of hairs):—

Style 2 or once 2-fid :—

Trees or shrubs. **2. Ehretia.**

Style 1, undivided; stigma capitate :—

Virgate shrub. **3. Rhabdia.**

Style depressed, conical at the apex or with a ring of hairs near the tip of style :—

Shrubs often scandent :—

Style short, shortly 2-lobed; pyrenes 2-seeded. **4. Tournefortia.**

Style gynobasic; nutlets attached to a calyx or conical carpophore; nutlets glochidiate. **5. Cynoglossum.**

1. **CORDIA** Linn.

Trees or shrub, sometimes sub-scandent, often with cystoliths. *Leaves* alternate, rarely sub-opposite, often with a marginal nerve, petiolate. *Flowers* polygamous, ebracteate, in dichotomous corymbose cymes or clusters. *Calyx* campanulate or tubular, accrescent in fruit; segments short, irregular or obscure. *Corolla* tubular or funnel-shaped; lobes usually 4-8, white, recurved, imbricate. *Stamens* 4-8, adnate to the tube, usually hairy at the base; anthers exserted. *Ovary* 4-celled; ovules 1 in each cell; style twice 2-partite; stigma capitate or clavate. *Fruit* drupaceous, ovoid or ellipsoid, usually with veined pulp; putamen hard, 1-4-celled, usually 1-seed fertile. *Seeds* exalbuminous; cotyledons plicate; radicle short.

Flowers small, white. Corolla tube as long as or shorter than the calyx. Stamens usually 4-5. Leaves alternate, sub-3 nerved :—

Cystolith cells not conspicuous on the upper surface of leaves. Leaves not tomentose beneath but rough; basal nerves 3-5. A middle-sized tree.

1. *C. dichotoma*.

Cystolith conspicuous as raised, generally white discs on the upper surface. Calyx not ribbed :—

Underside of leaves glabrous, sparsely hairy. A large tree.

2. *C. grandis*.

Leaves grey tomentose beneath. A middle-sized tree.

3. *C. fragrantissima*.

1. *Cordia dichotoma* Forst=C. Myxa Linn. Vern. *Bolmimang*, *Thekhaksum*, Garo; *Kotra*, *Boal*, *Goborhuta*, Ass.; *Aslia*, Sylh.; *Phai-imhuk*, Tipp.; *Dieng-mong*, Kh.; *Doba-Khari*, Mech; *Muk*, Lush.; *Dieng-soh-kh-mow*, *Dieng-pyrluh*, Synt.; *Bahari*, Nep.; *Siumang-asing*, Miri.

A middle sized deciduous tree with a long bole and drooping branches; bark ashy or brownish with shallow longitudinal wrinkles. *Leaves* variable, 1-5 by 1-3·3 in., broad-ovate, orbicular or elliptic-oblong, entire, sinuate or crenate, acute or bluntly acuminate, coriaceous, sparsely hairy beneath when young (especially on the nerves) more or less rough above; lateral nerves 4-6 on either half, first

pair sub-basal; base rounded or cuneate; petiole .5-1.5 in. long. *Flowers* white, fragrant in corymbose often paniced cymes. *Calyx* not ribbed, globose in bud, funnel-shaped, soon becoming accrescent. *Corolla* .1-.12 in.; tube hairy within. *Fruit* conical when young, yellow and glossy when ripe, ovoid, .75 in. in diameter, usually 1-seeded, filled with a viscid sweetish pulp.

Throughout Assam ascending upto 5,000 ft.

Flrs. 3-4. Fr. 6-8.

Var. brunnea Kz. A small tree. *Bark* greyish brown, exfoliating in irregular flakes; young shoots pubescent. *Fruit* 1 in. in diameter.

SYLHET, GARO HILLS, KHASI HILLS, (2,800 ft.).

Flrs. 3-4. Fr. 6-7.

2. Cordia grandis Roxb. Vern. *Kotra*, Kam.; *Kalauja*, Sylh.; *Bowal*, *Gobor-hutta*, Ass.; *Bol-dubak*, *Bol-munang*, Garo; *Dieng-jaing-nep*, Kh.; *Dersim*, Kach.

Tree (40'/70'') with a spreading crown. *Bark* light grey, very fibrous and hard; inside light brown with distant broad streaks of white tissue but instantly turning dark dirty brown. *Leaves* 2-8 by 1.5-7 in., orbicular, broadly ovate, entire, sessile or acuminate, obtuse, coriaceous, harsh with conspicuous whitish cystolith disk above, more or less felted beneath, 3-5-nerved; base cuneate, rounded or truncate; petiole slender, .5-4 in. long. *Flowers* white in dense pedunculate paniced cymes. *Calyx* not distinctly ribbed, tubular, campanulate, .2 in., accrescent in fruit. *Corolla* .1-.15 in. long. *Fruit* white, usually 1-seeded, ellipsoid, .5 in. with a viscid pulp.

KHASI & JAINTIA HILLS, SIBSAGAR, GARO HILLS, NOW-GONG, KAMRUP.

Flrs. 11-12. Fr. 3-4 (persists till the ending of cold weather).

3. Cordia fragrantissima Kurz. Vern. *Mahidal*, Cach.; *Lamuk laba*, Manip.; *Mukchal*, Lush.; *Chasim-phang*, Kach.; *Bahari*, Ass.; *Imhuk*, Tipp.; *Kawa-thuthi*, *Kaladuti*,

Sylh.; *Amuk-thing*, Kuki; *Chorsim-soh-arong*, Mik.; *Hem-mukching*, Naga.

A middle sized tree. *Bark* brownish grey with light parallel vertical fissures; inside brown with thin papery flakes turning dark brown. *Leaves* 2-8 by 1·5-6 in., ovate or orbicular, entire or sinuate, obtuse, chartaceous, harsh above, with cystoliths disks, sparingly hairy, stellately soft tomentose beneath, 3-nerved; base cuneate or rounded; petiole 2-3·5 in. long. *Flowers* white, usually 4-merous, fragrant, ·25 in. across, almost sessile, in paniced unilateral racemes, mouth of corolla hairy. *Fruit* ellipsoid, ·3 in. in diameter.

LUSHAI HILLS, CACHAR, N. C. HILLS, SYLHET, GARO HILLS, SIBSAGAR, DARRANG, NOWGONG, KHASI & JAINTIA HILLS.

Heart wood vertically mottled, scented, much prized. This timber deserves notice and is likely to be in great demand as house posts.

Flrs. 11-12. Fr. 3-4.

***Cordia Clarkei* Brace.**

A large tree (Prain). *Leaves* white, dotted above, densely tomentose beneath. *Calyx* densely tomentose. *Corolla* white; tube scarcely longer than the calyx. *Fruit* size of a pea.

NAGA HILLS.

2. EHRETIA Linn.

Trees or shrubs (blaze pale, rapidly turning brown on exposure). *Leaves* alternate. *Flowers* pentamerous, small, white, in terminal or axillary paniced cymes, rarely solitary. *Calyx* small, sub-5-partite. *Corolla* tube short, cylindric; lobes imbricate in bud. *Stamens* on the corolla tube. *Anthers* exserted. *Ovary* 2-celled; style terminal, bifid or 2-partite; stigma small, capitate. *Fruit* drupaceous with one 4-celled, two 2-celled or four 1-celled pyrenes, 1 or more often is reduced by suppression. *Seeds* straight; testa thin; albumen scanty; cotyledons small, oblong or ovate (not plaited).

Trees :—

Flowers paniced and cymose :—

Leaves serrate. 1. *E. acuminata*.

Leaves quite entire. Corolla rotate or broadly campanulate:—

Inflorescence sub-axillary, 3 in. across. ... 2. *E. lævis*.

Inflorescence axillary, large, 6 in. across:—

Corolla tubular. *E. lævis*.

Inflorescence pubescent, compact cymes, *Var. floribunda*.

mostly at the ends of lateral branch-
lets. 3. *E. Wallichiana*.

1. *Ehretia acuminata* Br. Vern. Kala-uja, Cach.; Lamuk, Manip.; Bojo, Mech.; Bol-artok, Garo; Jari-gach, Uozal, Pojhar, Gual, Ass.; Susang-asing, Sisho-payang, Miri; Changi-more, Duff.; Chelwan-arong, Chorsing-soh, Mik.; Jasim-jolu, Kach.; Dieng-basier, Kh.

A tree (80'/45") large; stems more or less fluted. *Bark* grey with vertical fissures, .5 in. apart, .3 in. thick, composed of many fibrous ribbons; blaze whitish, rapidly turning dirty brown. *Leaves* 2-6 by 1-2.5 in., elliptic, elliptic-oblong, acuminate, acute, sharply serrate, chartaceous, glabrescent, shining above; lateral nerves 8-10 on either half; petiole .5-1.5 in. long. *Flowers* white with an unpleasant smell, in terminal dense pyramidal panicle. *Calyx* small, ciliate. *Corolla* tube short; lobes .12 in., reflexed; style bifid for less than half its length. *Drupe* 1.2-1.6 in. in diameter, ellipsoid with two 2-celled pyrenes, 4-seeded.

CACHAR, GOALPARA, GARO HILLS, DARRANG, N.E. F. TRACT, LAKHIMPUR, SIBSAGAR, NOWGONG, KHASI HILLS ascending upto 4,000 ft.

Wood light brown, fairly compact, easily worked, used for agricultural implements (weight 37 lbs. per c. ft.). The fruit is eaten and the leaves are used as cattle fodder.

Flrs. 3-4. Fr. Cold season.

2. *Ehretia lævis* Roxb. Vern. Hanbuok-arong, Thengbo-mum-arong, Mik.

A middle sized tree, with spreading crown and irregularly shaped trunk. *Bark* nearly grey, split both vertically and horizontally, about .5 in. thick, greenish below the cuticle; inner substance soft yellow, not fibrous. *Leaves* 2-6 by 1.5-4 in., elliptic-ovate, entire, acuminate or obtuse,

membranous when young, fleshy when mature, shining above, dark green or glabrous except with the presence of a small tuft of hairs at the axils of the nerves beneath; lateral nerves 6-10 on either half; base cuneate or rounded; petiole .3-.8 in. long. *Flowers* white in dichotomously branched sub-axillary scorpioid cymes. *Calyx* usually pubescent, oblong-lanceolate, hardly accrescent. *Corolla* tube .1 in.; lobes .12 in., spreading, acuminate; style bifid. *Drupe* .2 in. in diameter, subglobose, 4-ribbed.

DARRANG, N. C. HILLS, LAKHIMPUR.

Wood fairly durable, sometimes used for agricultural implements. The leaves are used as cattle fodder.

Flrs. 3-4. Fr. Cold season.

Var. floribunda Brand. *Leaves* 2.5-7 by 1.3-3.5 in.; petiole .3-1 in. *Inflorescence* axillary collected towards the ends of the branchlets, 6 in. in diameter.

N. C. HILLS (Dehing river).

Flrs. 1.

3. *Ehretia Wallichiana* Hk. f. & T.

A middle sized tree; bark greyish brown, irregularly fissured, corky outside; inside dull white, mottled pale yellow but quickly turning very dark brown, softly fibrous. *Leaves* 3-6.5 by 1.5-3 in., elliptic or oblong, entire, acuminate, coriaceous, glabrous; lateral nerves about 7 on either half, sub-parallel, arcuate; base cuneate or obtuse; petiole .5-1 in. long. *Flowers* .5 in. long, fragrant, (before the leaves) in corymbiform minutely pubescent compact cymes, mostly at the ends of lateral branchlets from the axils of previous years' leaves. *Calyx* about .12 in., green; segments acute. *Corolla* tubular; tube .3 by .16 in.; lobes ovate, recurved. *Stamens* exserted; anthers variable. *Style* 2-fid near apex. *Drupe* sub-globose, longitudinally ribbed; pyrenes compressed.

GARO HILLS, SIBSAGAR.

Flrs. 3-4. Fr. Cold season.

Ehretia macrophylla Wall.

A tree. *Leaves* 4-7 by 4 in., broadly elliptic, unequally serrate, acute, rough with stiff hairs above, softly hairy beneath; base more or

less conical or rhomboid; petiole $\cdot 6\text{--}\cdot 8$ in. long. *Flowers* in short rounded terminal panicles. *Calyx*-segments $\cdot 16$ in. long, oblong-lanceolate. *Corolla* tube more than twice the length of the calyx. *Fruit* $\cdot 5$ in. across, globose, mucronate; pyrenes 2, each 2-celled.

NAGA HILLS.

3. RHABDIA Mart.

Rhabdia lycioides Mart. Modern name *Rotula aquatica* Lour. Vern. *La-khowang*, Kh.; *Tui-pui-sulla*, Lush.; *Singkhantha*, Garo.

A shrub; branches erect or persistent (growing along the beds of streams). *Leaves* $\cdot 3\text{--}\cdot 8$ by $\cdot 1\text{--}\cdot 2$ in., often fascicled on branchlets, linear-oblong or linear-lanceolate; lobes acute, entire, rather membranous, sparsely hairy, narrowed into a short petiole $\cdot 05$ in. long. *Flowers* pink, 5-merous (rarely 6) in 2-3 flowered shortly pedunculate cymes at the ends of short lateral branchlets. *Calyx* persistent, pubescent; segments lanceolate, acuminate. *Corolla* glabrous. *Ovary* 2-celled or sub-4-celled; stigma minutely 2-lobed. *Fruit* $\cdot 17$ in. in diameter, scarlet, fleshy, glossy with a red juice, pyrenes 4.

"Ropes are made from the tough split stems" (Haines).

Flrs. 10-1. Fr. 12-3.

4. TOURNEFORTIA Linn.

Trees or shrubs, often rambling or sub-scandent. *Leaves* entire, alternate. *Flowers* white or greenish yellow, 4-5-merous, in terminal rarely lateral dichotomous scorpioid cymes. *Calyx* segments ovate or lanceolate. *Corolla* tube usually cylindric, naked in the throat, hairy outside; lobes spreading. *Stamens* included; filaments short; anthers oblong. *Ovary* 4-celled; style short, terminal. *Fruit* drupaceous, small, ovoid with two 2-seeded pyrenes. *Seeds* straight or curved, albuminous; testa thin; cotyledons oblong.

Rambling or sub-scandent shrub:—

Corolla 5-merous; drupes sessile:—

Calyx teeth $\cdot 1$ in.:—

Corolla tube $\cdot 16$ in.

..

.. 1. *T. viridiflora*.

Leaves softly hairy beneath, distinctly reticulated, lineate.	Var. <i>Griffithii</i> .
Corolla tube .25 in. long.	2. <i>T. Candollii</i> .
Calyx teeth short, exceeding .16 in. :—	
Corolla tube exceeding .25 in.	3. <i>T. khasiana</i> .

1. Tournefortia viridiflora Wall. Vern. *Shamshog-asim-doukha*, Kach.; *Gondhai*, Manip.

A woody sub-scandent shrub; young parts hairy. *Leaves* 2.5 by 1.2-5 in., oblong-ovate, ovate-lanceolate, entire, acuminate, rather membranous, sparsely hairy above but with minute cystolith discs, softly hairy beneath; lateral nerves slender, impressed above about 7 on either half, oblique; base obtuse or rounded; petiole .1-5 in. long. *Flowers* 5-merous, in unilateral dense scorpioid spikes arranged in dichotomous terminal rusty villous cymes. *Calyx* segments .1 in., about half the length of the tubular corolla, .17 in. *Fruit* drupaceous, sessile, white and succulent when ripe, ovoid, beaked with the persistent style, .04 in. in diameter.

SYLHET (Wall), N.-E. F. TRACT, DARRANG, SIBSAGAR, NOWGONG, KAMRUP, CACHAR, N. C. HILLS and KHASI & JAINTIA HILLS ascending upto 3,000 ft.

Convalescent babies are bathed with an infusion of the roots. Leaves are used as vegetable by Manipuris.

Flrs. 4-9. Fr. Cold weather.

Var. Griffithii. Bark .25 in., thick, black, having minute vertical lenticels; blaze greenish, turning brown. *Leaves* distinctly reticulated beneath.

LAKHIMPUR.

Flrs. 3-4.

2. Tournefortia Candollii Clarke.

A shrub; young parts rusty villous. *Leaves* 1.3-4 by .5-3 in., ovate-lanceolate, entire, acuminate, rather membranous, softly rusty villous; lateral nerves 7-9 on either half, impressed above, slender but more prominent beneath; base narrowed into the petiole, sometimes obtuse or rounded; petiole .1-8 in. long. *Flowers* fragrant, at first mauve, turning nearly white, in terminal rusty pubescent, dichotomous cymes consisting of scorpioid spikes. *Calyx* segments

·1 in. *Corolla* tube ·25-·35 in.; mouth of corolla tube yellowish green. *Fruit* sessile.

SIBSAGAR, MANIPUR, KHASI & JAINTIA HILLS, 5,500 ft.

Flrs. 11-1. Fr. Hot weather.

3. *Tournefortia khasiana Clarke.*

A rambling pubescent shrub. *Leaves* 3-5 by ·9-1·5 in., ovate, ovate-lanceolate, acuminate, membranous, sparsely puberulous above, pubescent beneath; lateral nerves about 4 on either half, slender, oblique; base rounded or shallow cordate. *Flowers* in rusty pubescent scorpioid cymes, often much branched. *Calyx* ·15 in.; segments linear-lanceolate, acuminate. *Corolla* ·4 in. *Drupe* ·15 in., ovoid, glabrous (black when dry) crowned with the remains of the style.

KHASI HILLS (1,500 ft.).

Flrs. 1. Fr. 5.

Heliotropium strigosum Willd.

A small intricately branched herbaceous plant, rather stout (even woody) with harsh depressed hairs. *Leaves* ·2-·7 in. long, linear-lanceolate; margins recurved. *Flowers* white, usually in simple spikes. *Calyx* strigose; sepals lanceolate or ovate-lanceolate. *Corolla* strigose; lobes ovate, plicate. *Anthers* with a long acuminate connective. *Stigma* bluntly conical. *Nutlets* ·06 in., hispid above, greyish.

NORTH-EAST FRONTIER TRACT—Pasighat.

Flrs. & Fr. 7 (almost throughout the year).

5. CYNOGLOSSUM Linn.

Cynoglossum furcatum Wall & *C. glochidiatum Wall.*
Vern. *Ja-Byrtheid* Kh. also occur in the area.

Onosma Emodi Wall.

A hispid herb. *Leaves* sessile 2-4 by ·5-1 in., lanceolate or hispid. *Flowers* in capitate cymes; pedicels ·3 in. long; sepals ·3 in. long, ovate-acuminate, hispid, spreading in fruit. *Corolla* purplish, ventricose, narrowed at the mouth, hairy, ·6 in. long. *Anthers* included; style exserted. *Nutlets* 4, tuberculate.

NAGA HILLS.

Lycopsis arvensis Linn.

An annual hispid herb. *Leaves* 2 by ·3 in., oblong-acute, (upper amplexicaul; lower petioled). *Flowers* small, usually white in bracte.

ate terminal racemes, (3-6 in. long in fruit). *Calyx-segments* 5, linear, .16 in. long, oblong-linear, hispid, some what enlarged in fruit. *Corolla* tube curved in the middle, .25 in. long, narrowly cylindric; lobes 5, imbricate, .12 in. long. *Stamens* 5, spreading, attached near the base of the corolla tube. *Ovary* 4-lobed; style filiform; stigma capitate. *Nutlets* 4. *Carpophore* conical.

***Trichodesma khasianum* Clarke.**

, A stout somewhat setose shrub. *Leaves* opposite, large, 7 by 2.5 in. long, elliptic, narrowed at both ends, scabrous, tuberculate above, sparsely hairy beneath. *Flowers* in many flowered (50-100) terminal corymbose racemes. *Calyx* segments 5, rusty pubescent, enlarged in fruit (1 by .6 in.), papery, corolla tube .3 in. long; lobes 5 3 in. long. linear-lanceolate. *Stamens* 5, anthers elongate, connivent in a cone; cone about .5 in. long, patently white, hairy. *Ovary* 4-celled. *Fruit* ellipsoid, sub-4-ridged. *Nutlets* .25 in. long, widely margined.

KHASI HILLS.

Flrs. & Fr. Cold season.

FAM. 92. CONVOLVULACEÆ. (By C. B. Clarke.)

Herbs or shrubs, frequently twining, latex often present. *Leaves* mostly simple, palminerved, sometimes lobed, alternate, exstipulate, rarely leafless parasite (*Cuscuta*), some have tuberous roots, other rhizomes or tuberous stem. *Flowers* often showy, regular, hermaphrodite, hypogynous, usually 5-merous, solitary or cymose; bracts and bracteoles present. *Calyx* deeply partite, persistent, often enlarged in fruit; segments imbricate. *Corolla* of various shapes; limb lobed or angled, often plicate, induplicate valvate or convolute. *Stamens* epipetalous, usually on the base of the tube, alternate with petals; anthers usually introrse. *Disc* usually annular, entire or lobed or obsolete. *Ovary* superior (or rarely 3-5 carpels), cells as many as carpels or twice as many by false septa; ovules 2 in each carpel and more or less anatropous.

Fruit various, berry, capsule or nutlets. *Seeds* 4-1; albumen 0 or scanty; cotyledons usually foliaceous and plaited.

Non-parasitic green leafy herbs or shrubs usually twining:—

Pollen grains spinulose:—

Fruit indehiscent:—

Stigmas 2 with linear oblong lobes and fruit breaking up irregularly

1. **Rivea.**

Stigmas with rounded lobes. Calyx-segments not enlarging in fruit:—

Ovary 4-celled. Fruit dry or baccate. ..

2. **Argyreia.**

Ovary 2-celled. Fruit baccate. ..

3. **Lettsomia.**

Fruit usually dehiscent:—

Corolla usually campanulate. calyx segments not aristate; stamens not exerted.

4. **Ipomæa.**

Corolla usually salver-shaped; calyx segments aristate; stamens epipetalous:—

Flowers small, red, rather irregular. ..

5. **Quamoclit.**

Flowers large, white or purple, regular. ..

6. **Calonyction.**

Corolla small; lobes lanceolate; stamens arising from the backs of 5 scales attached to the base of the tube; fruit 4-valved. ..

7. **Lepistemon.**

Pollen grains not spinulose:—

Fruit usually dehiscent:—

Calyx segments much enlarged in fruit; bracts not enlarged in fruit, style entire or shortly 2-lobed.

8. **Porana.**

Calyx segments not or slightly accrescent in fruit:—

Style entire; stigmas usually 2-lobed. ..

9. **Hewittia.**

Style usually partly united below, not branched above; stigma 2, capitate. ..

10. **Breweria.**

Pollen grains not spinulose:—

Fruit usually dehiscent:—

Calyx segments not or slightly accrescent in fruit; style entire; ovary 2, sometimes more celled:—

Outer corolla segments larger than the inner and decurrent on the peduncle; stigma globose.

11. **Aniseia.**

Outer corolla segments not larger than the inner, not decurrent; stigma 2, globose:—

Capsule 4-valved, stem not usually winged.

12. **Merremia.**

Capsule dehiscent circumsciss, stem winged and angled.

13. **Operculina.**

Fruit indehiscent, woody or fleshy, rather large; style hardly any; corolla-lobes obcordate or emarginate; flowers yellowish white in panicles. 14. **Erycibe.**

Parasitic leafless twiner, yellow and herbaceous; embryo slender, spiral. 15. **Cuscuta.**

1. RIVEA Chois.

Erect or twining shrub. *Leaves* ovate-cordate, silky when young. *Flowers* in axillary few flowered paniced cymes, often supported by bracts. *Calyx* 5-fid; segments sub-equal. *Corolla* large, white, salver-shaped; tube narrow, obscurely lobed; lobes rounded, plicate. *Disc* annular. *Stamens* included. *Ovary* 4-celled with 4 ovules; style filiform; stigmas linear-oblong. *Fruit* sub-globose, nearly dry, indehiscent or breaking up irregularly. *Seeds* 1-4, glabrous in a mealy pulp.

Stout, usually erect shrubs:—

Peduncles 3-7 flowered. Leaves usually broader than long. Corolla usually white silky without. Calyx-segments lanceolate. 1. *R. Ornata.*

Scandent shrub:—

Peduncles 1-3 flowered. Leaves usually not broader than long. Corolla usually glabrous without. Calyx segments ovate-obtuse. .. 2. *R. hypocrateriformis.*

1. Rivea ornata Chois. Var. *Griffithii* Clarke = *Rivea Roxburghii* Prain. Vern. *Takaria-alu*, Ass.

An erect spreading shrub or undershrub with woody base and herbaceous stem; young parts densely silky, pubescent or villous, 3-6 in. across, orbicular or cordate or reniform, often apiculate, sometimes emarginate, bright silky beneath; lateral nerves 5-10 on either half; petiole 1.5-2 in. long. *Flowers* white, fragrant; peduncles stout, long, upto 5 in. long. *Calyx* segments .5-.6 in. long, oblong or ovate-lanceolate, acute. *Fruit* reddish brown, 1-celled.

KHASI HILLS (4,500 ft.).

Flrs. 9. Fr. 12.

2. *Rivea hypocrateriformis* Chois.

A twining climber; young parts villous. *Leaves* 1-4 in. long, orbicular, cordate, rarely broader than long, adpressed, silky beneath; lateral nerves about 6 on either half; petiole upto 2 in. long. *Calyx-segments* .3 in. long, ovate-elliptic, obtuse. *Fruit* globose, .5 in., in diameter. *Seeds* 1-4.

ASSAM (Griffith).

Flrs. 9. Fr. Cold season.

2. ARGYREIA Lour.

Climbing shrubs, rarely erect. *Leaves* ovate-cordate to lanceolate, usually silky hirsute or pubescent beneath. *Flowers* showy, in axillary corymbose or capitate cymes; bracts usually conspicuous. *Calyx* 5-fid; segments equal or unequal, sometimes a little accrescent in fruit. *Corolla* tubular, funnel-shaped, 5-angled or lobed; limb plicate. *Stamens* 5, included; filaments often thickened at base; anthers oblong, straight. *Disc* annular. *Ovary* 4-celled, 4-ovuled; style filiform; stigmas 2, globose. *Fruit* baccate, dry or fleshy. *Seeds* 1-4, embedded in mealy pulp.

Bracts persistent:—

Peduncles 1 in. long or less. Flowers campanulate. Leaves densely grey tomentose beneath.

1. *A. nervosa*.

Bracts caducous or deciduous:—

Leaves usually cordate, glabrous above, white tomentose beneath:—

Corolla silky externally on the folds not white tomentose beneath (glabrescent or somewhat hairy).

2. *A. speciosa*.

Corolla tube glabrescent, limb sparsely hairy.

3. *A. Hookeri*.

Corolla sparsely hairy externally on the folds. Leaves sparsely hairy above, adpressed silky beneath.

4. *A. argentea*.

Corolla densely silky on the buds. Leaves softly and sparsely hairy on both surfaces; bracts semi-persistent, semi-foliaceous.

5. *A. Roxburghii*.

Leaves elliptic-oblong, acuminate or acute, glabrous above, softly silky white beneath:—

Corolla sparsely hairy on the folds externally.

6. *A. splendens*.

1. *Argyreia nervosa* (Burm. f.) Boj=A. Wallichii Choisy. Vern. *Jatap-masi*, Kh.; *Jomang-pi-danok-soh-ring-kang*, Mik.

A large climber. *Leaves* 4·5-7 by 3·5·5 in., ovate or sub-orbicular, cordate, acute, chartaceous, glabrous above, densely grey tomentose beneath; lateral nerves about 8 on either half; petiole 2-4·5 in. long. *Flowers* in axillary capitate cymes; peduncles 1 in. or less. *Calyx* segments 2-3 in., elliptic-oblong. *Corolla* white, tinged with light rose, about 2 in. long, 1·25 in. broad at tip; lobes scanty, distinct.

KHASI HILLS.

Leaves are used as vegetable.

Flrs. 10.

2. *Argyreia speciosa* Sweet.

An extreme woody climber; branches and young shoots densely white tomentose. *Leaves* 4-12 in. across, ovate or bi-cordate, acute, quite glabrous above, persistently white tomentose beneath; lateral nerves 12-15 on either half, some are quite close to the base; petiole 2-9 in. long, stout, white tomentose. *Flowers* in long peduncled corymbose cymes; bracts deciduous, large, foliaceous, ovate-lanceolate, acute or acuminate. *Calyx* white, tomentose outside; segments oblong-elliptic, obtuse, leatherly (·5 by ·25 in.) in fruit. *Corolla* 2-2·5 in. long, white silky, pubescent outside, purplish, glabrous inside. *Fruit* about 1 in. in diameter, depressed apiculate, yellow inside; cotyledons intricately plaited.

KHASI HILLS, plain districts.

Flrs. Rainy season. Fr. Cold season.

3. *Argyreia Hookeri* Clarke. Vern. *Tille-kumou-blanc*, Synt.

A large climber, old leaves yellow; young shoots silky. *Leaves* 4-8 by 2·5·5 in., orbicular, cordate, blunt, membranous, puberulous above, pubescent beneath; lateral nerves 9-10 on either half, 3 pairs from near the base; petiole 2·5-7 in.

long. *Flowers* in dichotomous corymbose few-flowered cymes; peduncles 2-12 in.; bracts caducous. *Calyx* segments ovate-acute, grey canescent, .3 in. long, accrescent in fruit. *Corolla* rosy, tubular-infundibuliform, 2-2.5 in. long. *Fruit* depressed globose, bright orange, 4-celled, 4-seeded. *Seeds* globose white.

KHASI HILLS.

Flrs. Rainy season. Fr. Cold season.

4. *Argyreia argentea* Chois. Vern. *Bish-dharak*, Beng.

A large climber. *Leaves* 3-5 by 2-6.5 in., ovate-cordate, obtuse, acute, membranous, sparsely hairy above, densely adpressed silky beneath, sub-coriaceous; petiole 2-4.5 in. long. *Flowers* in dense peduncled corymbose cymes; bracts inconspicuous. *Corolla* 2 in., sparsely hairy on the folds outside. *Fruit* obscurely 4-lobed, fleshy orange about the seeds.

CACHAR, DARRANG, KAMRUP.

Leaves are tied on ring sores to dry and cure them.

Flrs. Rainy season. Fr. Cold season.

5. *Argyreia Roxburghii* Chois.

A large climber. *Leaves* broader than long, ovate-cordate, obtuse or notched, subcoriaceous, softly villous on both sides; lateral nerves about 8 on either half, prominent beneath; base shallow cordate; petiole 1.5-3 in. long. *Flowers* in axillary dense subcapitate cymes; peduncles long; bracts often large, leaflike, semi-persistent. *Calyx* elliptic-lanceolate, villous. *Corolla* tube 2.7 in. long, purplish, sparsely hairy externally.

KHASI HILLS.

Flrs. 8. Fr. 11.

6. *Argyreia splendens* Sweet. Vern. *Doukha-kaphuti*, Kach.; *Biang-han*, Mik.; *Khangiana-ria*, Naga; *Soh-laigur-biding-doukha*, Kach.

A large climber. *Leaves* 2.5-8 by 1.5 in., elliptic-oblong or ovate-elliptic, acute or acuminate, sub-coriaceous, glabrous

above, softly adpressed silky beneath; lateral nerves 13-17 on either half, prominent, sub-parallel; base rhomboid or rounded; petiole 2-4·5 in. long. *Flowers* white with blue centre, in lax corymbose cymes; peduncles 1-4 in. long; bracts small, caducous. *Calyx* segments ovate-acute, pilose, coriaceous, hard and dark-red in fruit. *Corolla* sparsely hairy on the folds outside. *Fruit* globose or orbicular, ·5 in. in diameter, 3-seeded.

NOWGONG, SIBSAGAR, N. C. HILLS, NAGA HILLS, KHASI HILLS.

Goats are fond of the leaves.

Flrs. 4-5. Fr. Cold season.

3. LETTSOMIA Roxb.

Climbing shrubs, more or less hairy. *Leaves* cordate or rounded at the base. *Flowers* in axillary dense peduncled cymes. *Calyx* segments 5, somewhat accrescent in fruit. *Corolla* funnel-shaped; limb plicate. *Stamens* 5, included or exserted; pollen grains spinulose. *Disc* annular. *Ovary* 2-celled, 4-ovuled; style filiform; stigma of 2 round lobes. *Fruit* baccate, indehiscent. Seeds 1-4, embedded in mealy pulp.

Fruit usually 2-4 seeded:—

Corolla 1 in. long or more. Stamens included:—

Bracts persistent, broad, 1 in. long or shorter:—

Calyx segments smaller than the bracts;
bracts 1 in. long. 1. *L. strigosa*.

Calyx segments longer than the bracts;
bracts ·3-·5 in. long. 2. *L. barbiger*a.

Bracts persistent, lanceolate or linear,
longer than 1 in.:—

Leaves 4-6 in. long; petiole 1-6 in. long. 3. *L. Mastersii*.

Leaves 6-8 in. long; petiole ·5-·8 in. long. 4. *L. longifolia*.

Bracts deciduous or one of the outer sometimes leaf-like; stem closely strigose.

Corolla 2·5-3 in.; petiole 2-5 in. long. .. 5. *L. sikkimensis*.

Bracts caducous; stem softly hairy.

Corolla 1·5-2 in.; petiole 2-3 in. long. .. 6. *L. rubens*.

*L. barbiger*a Clarke; *L. sikkimensis* Clarke; *L. rubens* Clarke; *L. Mastersii* Prain; *L. longifolia* Coll, which are

recorded from the region of the flora are not described in details as they are not of great importance from forest point of view.

1. *Lettsomia strigosa* Roxb.

A large stout climber with milky-juice, brownish-hairy. *Leaves* 3-5 by 2·5-4·5 in., broadly ovate-cordate, acuminate, rather coriaceous, densely hairy with patent hairs on both surfaces; lateral nerves 16-19 on either half at an angle of 60°-90° with the midrib; petiole 1-5·5 in. long. *Flowers* light rosy in long peduncled capitate cymes; peduncles 3-5 in.; bracts elliptic-oblong, persistent, hairy. *Calyx* segments densely hirsute with patent hairs. *Stamens* included; anthers oblong, not twisted; filaments hairy at base; stigma globose. *Fruit* ·25 in., 2-4-seeded.

CACHAR, SYLHET, DARRANG, KHASI HILLS.

Flrs. 10-12. Fr. 2-3.

4. *IPOMÆA* Linn.

Twining or prostrate herb or shrubs, rarely erect. *Leaves* alternate, simple entire or lobed, cordate, sometimes palmately compound. *Flowers* often showy, axillary, solitary or in cymes. *Calyx* segments 5, equal or unequal, often accrescent in fruit. *Corolla* campanulate or funnel-shaped, entire or slightly lobed; limb plicate. *Stamens* 5, included; anthers straight or twisted; filaments often unequal, hairy or dilated at the base, smooth or bearded, pollen grains spinulose. *Ovary* usually 2-celled, rarely 4; ovules 4; stigma lobes 2, globose. *Capsule* usually 4-valved. *Seeds* usually 4; cotyledons crumpled, often 2-lobed.

Ovary 3-celled, 6-ovuled:—

Corolla tube narrow:—

Leaves 3-lobed	..	..	..	1.	<i>I. hederacea.</i>
Leaves entire.	..	..	..	2.	<i>I. purpurea.</i>

Ovary 4-celled:—

Corolla widely funnel-shaped:—

Leaves palmately and deeply 5-7 lobed, scandent.	..	..	..	3.	<i>I. digitata.</i>
Leaves triangular, ovate, angled or sharply lobed, prostrate (sweet potatoes).	..	..	..	4.	<i>I. Batatas.</i>

Ovary 2-celled:—

Sepals green, heraceous, equal or nearly so:—

Flowers capitate, pinkish:—

Heads sessile or sub-sessile; bracts ovate, linear. 5. *I. hispida*.

Heads long peduncled; bracts large, boat-shaped, including the head. 6. *I. involucrata*.

Flowers pedicelled:—

Leaves not deeply or palmately lobed, or only 2-3 lobed:—

Sepals sub-equal, ovate-obtuse. Leaves hastate, triangular or lanceolate, creeping prostrate or floating aquatic 7. *I. reptans*.

Sepals equal, orbicular. Leaves ovate or ovate deltoid, shrubby subscandent littoral. 8. *I. staphylina*.

Sepal oblong-elliptic. Leaves ovate or orbicular, cordate, entire. A large climber. 9. *I. Gomezii*.

Leaves deeply 5-7-lobed or palmately compound:—

Sepals glabrous. Corolla purplish. 10. *I. cairica*.

1. *Ipomæa hederacea* Jacq.

An extensive twining annual; stem hirsute. *Leaves* 2·5-4·5 by 1·8-3 in., broadly ovate-cordate, acuminate, 3-angled or more or less deeply lobed, less often entire, lobes acuminate, sparsely pubescent above, more densely beneath; petiole 2-4 in. long. *Flowers* blue or purple, tubular, funnel-shaped, up to 2·5 in. long, about 1·5 in. across, 1-5 together on long peduncles. *Calyx* segments ligulate acuminate; filaments woolly at the base; anthers sagittate (not twisted). *Ovary* 3-celled, 6-ovuled. *Capsule* ·4 in. across. *Seeds* 4 or 6.

KHASI HILLS, Shillong (cultivated or escapes in hedges).

The seeds are used as purgative.

Flrs. & Fr. 6-2.

2. *Ipomæa purpurea* Lamk. Morning glory.

Climber with retrorse hairs. *Leaves* 2·5-4 in., orbicular, ovate-cordate, entire, membranous; petiole 1·5-3 in. long. *Flowers* purplish to white, umbelled in apex of a peduncle which is longer than the petiole, each pedicel supported by 3 subulate bracts. *Calyx* segments short, acuminate, or un-

equal widths with spreading hairs at base. *Ovary* 3-celled. *Seeds* usually 6, glabrous.

Cultivated; apparently wild in KHASI HILLS (Barpani).

Flrs. 10. Fr. Cold season.

3. *Ipomæa digitata* Linn.=*l. paniculata* Br..

An extreme climber; stem glabrous. *Leaves* 3-6·5 in. in diameter, sub-orbicular, palmately 5-7 lobed; lobes acuminate; base cordate; petiole 1·5-5 in. long. *Flowers* in pedunculate corymbose cymes. *Corolla* pink-purple, wide-campanulate, 1·5-2·5 in. long. *Calyx* segments accrescent in fruit. *Ovary* 4-celled, 4-valved. *Seeds* hairy or woolly.

KHASI HILLS, SIBSAGAR.

Flrs. 7-8. Fr. Cold season.

Ipomæa Learii Paxt.

A large hirsute perennial twiner. *Leaves* ovate-cordate, entire or slightly lobed, acute, sparsely hirsute above, more so beneath. *Flowers* blue in 3-7 flowered, congested pedunculate cymes, often 1 bract, foliaceous. *Corolla* 2·5-3 in. long, glabrous outside.

Gauhati. A TROPICAL AMERICAN species, cultivated.

Flrs. 7. Fr. later.

4. *Ipomæa Batatas* Lamk. Vern. *Shakar-kand-alu*, *Mitha-alu*, Beng. & Hind.; *Sa-lah*, Synt. The sweet potato.

A prostrate annual trailing on the ground, with milky juice. *Leaves* 1·3·5 by ·8-2·5 in., ovate-cordate more or less lobed; petiole up to 3 in. long. *Flowers* purple, 2 in. long.

Cultivated throughout the Province for the sake of the tubers of which there are 2 varieties (not white).

5. *Ipomæa hispida* Roem.=*l. eriocarpa* R. Br.

Wing trailing herb. *Leaves* 1·5-2 by ·2·8 in., lanceolate, triangular or ovate, acuminate or acute, cordate; petiole 1·1·5 in. long. *Flowers* rosy ·3·5 in. long and across, in sessile or almost sessile capitate cymes. *Calyx* segments not enlarged in fruit. *Corolla* ·6·75 in. across, stigma rounded,

scarcely lobed. *Capsule* globose, hairy, 2-celled, 4-seeded. *Seeds* puberulous or glabrous, pitted.

K. & J. HILLS.

Flrs. 10. Fr. Cold season.

6. *Ipomæa involucrata* Beauv.=*I. pileata* Roxb.

A slender wing annual, twining or trailing; stem hairy. *Leaves* 2-5 by 1-3 in., orbicular, ovate-acuminate; petiole 1-3·5 in. long. *Flowers* light purple, about 1 in. long, capitate, long peduncled, enclosed in a perfoliate boat-shaped involucre consisting of connate bracts. *Calyx* segments unequal. *Corolla* tube ·75 in. long, ·1 in. in diameter; stigma 2-lobed, pink. *Fruit* globose, 4-seeded, pericarp many.

K. & J. HILLS.

Flrs. & Fr. 10.

7. *Ipomæa reptans* Poir. Syn. *I. aquatica* Forsk. Vern. *Kalmi*, Beng.

A glabrous aquatic herb with milky-juice; stem floating or trailing, rooting at the nodes. *Leaves* hastate or cordate, entire or more or less angularly lobed. *Flowers* pale, rosy, 2 in. long.

Common in the plains districts, in ponds or low lying swampy localities.

The leaves and under-shoots are eaten as vegetable.

Flrs. & Fr. Rainy season, probably throughout the year.

8. *Ipomæa staphylina* Roem. & Sch.=*I. racemosa* Roth.

A glabrous large scandent shrub. *Leaves* 2-5 by 1-3 in., ovate, sub-acute, rather thick, glabrous, dull green above and beneath, sub-cordate at base; lateral nerves prominent, 8-10 on either half; petiole 1-2·5 in. long. *Flowers* numerous in panicles which are usually larger than the leaves; bracts small, caducous; pedicels ·1-·3 in. long. *Calyx* segments ·2 in. long, glabrous. *Corolla* white, slight tinged, purplish, about 1 in. long, narrowly campanulate. *Capsule* ovoid,

sub-acute, .3 in. long, 4-seeded. *Seeds* clothed with long silky hairs.

ASSAM (Jenkins).

Flrs. 11-12. Fr. Hot season.

I. obscura and **I. polyantha**. **Var. affinis** are also recorded from the region of the flora by G. Mann.

9. *Ipomæa Gomezii* Clarke.

A large climber. *Leaves* 3-6 in. long, ovate-orbicular, cordate, entire, acute, glabrous; petiole about .2 in. long; flowers very large, corymbose; peduncles short, 2-3 in. long; pedicels stout, about 4 in. long. *Calyx* accrescent in fruit; segments oblong-elliptic 1.25-1.75 by .8-1 in. *Corolla* campanulate. *Fruit* globose, brownish, .4 in. in diameter, supported by a ring of long golden brown hairs at the base.

LAKHIMPUR (Dulongmukh).

Flrs. 3. Fr. Rainy season.

10. *Ipomæa cairica* Sweet=*Ipomæa palmata* Forsk. =*I. pulchella* Roth. Vern. *Khom-chili-rang*, Kuki.

An exclusive climber. *Leaves* 1-4 in. in diameter, usually subpedately 7-lobed, membranous, glabrous; petiole .6-2 in. long. *Flowers* purplish; peduncles usually 3-flowered, shorter than the petiole. *Calyx* segments glabrous, acute. *Corolla* purplish white outside, deep purple inside, narrow campanulate. *Stamens* of unequal length. *Capsule* ovoid, .4 in., 2-celled, 4-seeded. *Seeds* hairy.

N. C. HILLS. Doubtfully indigenous.

Flrs. 5.

5. QUAMOCLIT Choisy.

Flowers in axillary long peduncled few-flowered cymes. *Calyx* segments 5, aristate. *Corolla* salver-shaped, slightly irregular; tube slender, slightly funnel-shaped. *Stamens* 5, exserted; filaments unequal. *Ovary* glabrous, 4-celled,

4-ovuled; stigma 2, globose. *Capsule* 4-celled, 1-valved. *Seeds* 4, black.

Leaves ovate-cordate. Calyx segments acuminate. Seeds pubescent. 1. *Q. phænicea*.
 Leaves deeply pinnate; segments filiform.
 Calyx segment elliptic. Seeds almost
 glabrous. 2. *Q. pennata*.

1. *Quamoclit phænicea* Choisy. Syn. *Ipomæa coccinea* Cl.

A herbaceous climber. *Leaves* 1·5-3 in. long, ovate-cordate, sometimes acutely lobed. *Corolla* large, salver-shaped, about 1·5 in. long, red or orange. *Seeds* pubescent.

Cultivated. Dhubri.

Flrs. Rainy season. Fr. Cold season.

2. *Quamoclit pennata* Boj. Syn. *Ipomæa Quamoclit*, Linn. *Tarulata*, Sans.

A graceful slender climber. *Leaves* pinnate-partite; segments filiform. *Corolla* salver-shaped, bright red or white. *Seeds* almost glabrous.

Cultivated. Silchar.

Flrs. & Fr. Rainy season.

6. CALONYCTION Choisy.

Flowers solitary or in few-flowered axillary cymes. *Calyx* segments 5, sub-equal or outer smaller sometimes aristate. *Corolla* large, salver-shaped; tube long, slender; limb plaited. *Stamens* exserted, sometimes quite slightly or almost included; stigma lobes 2, rounded. *Ovary* 2-celled, 4-ovuled. *Fruit* often developing false partitions.

Flowers white:—

Pedicels not usually thickened under the fruit:—

Seeds villous with shaggy margins. Calyx segments ovate or orbicular, accrescent in fruit. 1. *C. comorensis*.

Seeds yellow:—

Calyx segments unaltered or slightly enlarged in fruit. 2. *C. bona-nox*.

Flowers purple:—

Pedicels greatly thickened under the fruit:—

Seeds black:—

Calyx segments ending in a long cusp or
acumen, keeled. 3. *C. muricatum*.

1. Calonyction comorensis Bojer. Syn. I. grandiflora Lamk. 1. glaberrima Bojer.

A large twiner in swampy locality on reeds; stem muricate and obscurely fluted. *Leaves* 2·5-4·5 by 1·8-3 in., broadly cordate, often irregularly lobed; basal nerves about 7; petiole 2-4 in. long. *Flower* buds ovoid. *Calyx* segments thick, every sharply margined, ovate or orbicular, accrescent in fruit. *Corolla* funnel-shaped, tube about ·3 in. in diameter; filaments 1·5-2 in. long, tapering, hairy in the lower half; style slender. *Seeds* villous, margins shaggy.

KHASI HILLS.

Flrs. & Fr. Cold season.

2. Calonyction bona-nox Boj. Syn. Ipomæa Bona-nox Linn. Var. glandiflorum Chois. Moon flower. Vern. Phan-soh-kari-khnai, Khasi.

A large glabrous climber. *Leaves* 4-7 by 3·5-5 in., ovate-orbicular, cordate, finely acuminate, rather membranous, glabrous. *Flowers* white, 3-5 in. across, axillary; peduncles 1-5 flowered; pedicels 2·5-3 in. *Calyx* segments aristate. *Corolla* tube cylindrical, about 4 by ·2·25 in., lobes spreading; anthers pubescent, about 1 in., lanceolate. *Capsule* about 1 in. long. *Seeds* yellow.

KHASI HILLS, NOWGONG.

Flrs. 10. Fr. 12.

3. Calonyction muricatum G. Don. Syn. Ipomæa muricata Jacq.

A twiner, usually with muricate stem. *Leaves* 2·5-6 in., broadly ovate, entire, glabrous. *Flowers* purplish; peduncles 1-5-flowered; pedicels extraordinarily thickened under the fruit. *Calyx* segments tapering about 5. *Corolla* 2-3 in.

long; capsule .5 in. across, globose, spiculate. *Seeds* smooth, black.

MANIPUR.

Flrs. Rainy season. Fr. Cold season.

7. **LEPISTEMON** Blume.

Lepistemon Wallichii Chois.

A stout scandent shrub; stem villous. *Leaves* 2-4.5 by 1.5-3 in., ovate-acute, entire or often 3-lobed, hirsute, cordate; petiole 1-3 in. long, cymes axillary, 5 to 30 flowered; peduncles usually short; pedicels .5 in. *Calyx* teeth .3 in., hirsute, lanceolate-acuminate. *Corolla* .5-.6 in. long, yellowish-white .2 in. across, tubular; tube hairy outside, dilated at base, mouth funnel-shaped; filaments short, dilated at the base into 5 concave scales conniving over the ovary at the base, glabrous above, basal process papillose. *Disc* large, cupular. *Ovary* 2-celled, 2-ovule in each cell; style very short; stigma bipartite. *Capsule* .25 in., ovoid, glabrous, 4-valved. *Seeds* glabrous.

CACHAR, MANIPUR, KHASI HILLS upto 4,000 ft.

Flrs. 10-11. Fr. 3-4.

8. **PORANA** Burm.

Scrambling or twining shrub. *Leaves* ovate, usually entire, petiolate. *Flowers* in axillary cymes, racemose or copiously paniculate; bracts persistent. *Calyx* segments 5, small, equal in flowers, accrescent in fruit developing into large ribbed and veined wings. *Corolla* campanulate or funnel-shaped; limb plicate, sub-entire or lobed. *Stamens* sub-included; filaments slender; anthers not spinulose. *Ovary* 2-celled or 1-celled; ovules 2-4; style slender; stigma solitary, 2-lobed or 2-capitate. *Fruit* globose, 1-seeded, membranous, indehiscent or opening by 2-valves. *Seeds* glabrous; cotyledons plicate.

Flowers large, about 1 in. long:—

3 calyx-segments developing into veined
wings in fruit, tomentose. Leaves velvety on
both sides. 1. *P. spectabilis*.

Flowers small, .25-.5 in. long :—

All calyx-segments enlarged in fruit and equal:—

- | | | | |
|--|---------|----|-----------------------|
| Fruiting segments .3-.5 by .12 in.; capsule ellipsoid, .2 in. | .. .. . | 2. | <i>P. racemosa.</i> |
| Fruiting segments .6 by .3 in., capsule obconic, truncate, .3 in. | .. .. . | 3. | <i>P. truncata.</i> |
| 3 calyx-segments greatly enlarged in fruit, pubescent, reticulate. | .. .. . | 4. | <i>P. paniculata.</i> |

1. *Porana spectabilis* Kurz.

A large climbing shrub, tawny, tomentose. *Leaves* 2.5 by 1.8-3 in., ovate-oblong or ovate (rarely suborbicular), acute or subobtuse, mucronate, subcoriaceous, puberulous above, pubescent or woolly beneath; petiole up to 1 in. *Flowers* white, in long axillary racemes. *Calyx* segments about .5 in., linear-oblong, tawny tomentose. *Corolla* funnel-shaped, 1.5 in. long; style as long as corolla tube; stigma capitate. *Capsule* .2 in. across, sub-globose.

NAGA HILLS, LUSHAI HILLS.

Flrs. 11-12. Fr. 3-6.

2. *Porana racemosa* Roxb.

A slender deciduous climber often trailing; stem pinkish, pubescent, old leaves copper-coloured. *Leaves* 2.4-5 by 1.3-3 in., ovate-acuminate, broadly cordate, membranous, sparsely puberulous above, glabrous beneath, usually 5-basal nerved; petiole .5-2 in. long. *Flowers* white, in axillary and terminal dichotomous compound racemes; bracts persistent, ovate, deeply cordate, short, acuminate, sessile, light pinkish, about 1 by .2-.6 in., all calyx-segments accrescent in fruit, equal, narrowly oblanceolate, mucronate, green at base, reddish brown above, .3-.5 by .12 in. *Corolla* about 1 in., cleft more than half the length; lobes longer than the tube. *Capsule* .2 by .1 in., crowned with remains of style, green, glabrous, slightly tapering, nodding on slender pubescent pedicels .25 in. long.

KHASI HILLS (5,800 ft.).

Flrs. 9-11. Fr. Cold season.

3. *Porana truncata* Kurz.

A slender climbing shrub, almost glabrous. *Leaves* 1·5-4 by 1·2-5 in., ovate or suborbicular, entire or distantly shallow, angled, acuminate, membranous, glabrous, usually 5-basal nerved; base cordate; petiole up to 4 in. long. *Flowers* in dichotomous compound racemose cymes; bracts foliaceous, cordate, persistent. *Flowers* not seen. *Capsule* ·25 in., obconoid, truncate. *Fruiting* calyx-segments equal, elliptic, ·6 in. long, narrowed at both ends, 5-7-nerved from the base.

(No specimen in Forest Herbarium, Shillong).

KHASI HILLS (Mairang 16,602 C. B. Clarke).

Fr. 10.

4. *Porana paniculata* Roxb. Vern. *Rikamir*, Miri. The bridal creeper.

An extensive dextrorse woody climber. *Bark* rough, light brown; branchlets and inflorescence grey tomentose; blaze whitish, turning brown. *Leaves* variable, usually 1-5 by ·6-4 in., smaller towards the inflorescence, ovate-cordate, acuminate, entire, membranous, pubescent, 5-7-basal nerved; petiole ·5-3 in. *Flowers* white, faintly sweet-scented, ·15-·25 in. long, in terminal and axillary lax panicles; bracts foliaceous; bracteoles subulate, ·3 in. *Calyx* segments greatly enlarged into veined wing in fruit, pubescent, reticulate. *Capsule* thin, fragrant, pubescent outside, shortly apiculate, about ·2-·3 in. long.

Common throughout the Province.

Twigs are suitable for making coarse baskets.

Flrs. 10-12. Fr. 1-3.

9. HEWITTIA W. & A.

Hewittia bicolor Wight.

A pubescent perennial slender climber generally trailing. *Leaves* 2-5 in. across, cordate-ovate, sometimes somewhat lobed or angled, acuminate or acute, membranous, puberulous on both sides; petiole ·6-1·8 in. long. *Flowers* 1·5 in. across, light pale-dun with dark purplish brown centre in axillary cymes, sometimes solitary. *Calyx* segments foliaceous.

ous, unequal. *Corolla* hairy without, shortly 5-lobed. *Stamens* included; filaments subulate, dilated at the base; bract purpule. *Ovary* villous. *Fruit* capsular, 4-valved, 2-3-seeded. *Seeds* glabrous.

N. C. HILLS (not common).

Flrs. 5. Fr. Cold season.

10. BREWERIA R. Br.

Breweria cordata Blume.

A large twining shrub, rusty tomentose. *Leaves* 2-3 by 1.5-2.5 in., ovate, acute or acuminate, entire, rusty tomentose or villous; lateral nerves rather obscure; base cordate; petiole 1-2 in. long; peduncles 1-2.5 in. long, 2-5-flowered; bracts .2-.3 in., oblong; cymes rusty-tomentose. *Calyx* segments .3-.5 in. long, ovate-oblong. *Corolla* white, funnel-shaped, 1.5 in. long, hairy without; limb plaited. *Stamens* included; style 2, united partially at the base; stigma capitate. *Capsule* sub-globose, glabrous, .5 in. long. *Seeds* almost glabrous.

SYLHET.

Flrs. 10-11. Fr. 2.

11. ANISEIA Choisy.

Aniseia martinicensis (Jacq.) Choisy=A. uniflora Choisy=Ipomæa uniflora Roem. & Sch.

A slender creeper or climber. *Leaves* .8-3 by .5-1 in., ovate or oblong, often mucronate; petiole .3-.5 in. long. *Flowers* solitary, axillary. *Calyx* segments 5, unequal, herbaceous, outer 3 larger, decurrent, accrescent in fruit. *Corolla* widely campanulate, white, pubescent outside. *Stamens* 5, included; filaments filiform; anthers not spinulose. *Ovary* 2-celled; style filiform; stigma 2, globose; ovules 4. *Capsule* 4-valved, ovoid, .5 in. long. *Seeds* 4, black, smooth.

LAKHIMPUR (Gage).

Flrs. & Fr. 10-12.

12. **MERREMIA** Dennst.

Climbing, rarely prostrate herbs or shrubs. *Leaves* alternate, entire, lobed or divided. *Flowers* axillary, solitary or in few flowered cymes; peduncles long; bracts small. *Calyx*-segments 5, sub-equal. *Corolla* campanulate or funnel-shaped, usually white, sometimes yellow or orange; the tube with 5 vertical bands marked by 5 dark violet lines; limb plicate, slightly 5-lobed. *Stamens* 5, unequal, included or exserted; filaments filiform; anthers usually twisted, pollen not spinulose. *Ovary* 2-4-celled; ovules 4; style filiform; stigma 2, globose. *Capsule* 4-valved, 1-4, tubular, sometimes the style separating with a small stipule. *Seeds* 4, dull, glabrous, rarely puberulous; cotyledons crumpled.

Corolla more or less hairy outside :—

Seeds with spreading hairs :—

Corolla villous at the apex :—

Cymes subumbellate. 1. *M. umbellata*.

Corolla glabrous outside :—

Buds conical, long, acute :—

Corolla more than 1 in. long :—

Leaves 5-7 lobed, vein-like :—

Corolla yellow. 2. *M. vitifolia*.

Corolla less than 1 in. long :—

Calyx-segments glabrous, obtuse :—

Leaves petioled :—

Peduncles 3, many flowered. .. 3. *M. cæspitosa*.

Buds short, globose, obtuse :—

Calyx-segments glabrous, truncate and cucullate :—

Peduncles 3-7 flowered. .. 4. *M. chryseides*.

1. *Merremia umbellata* Hallier f. = *Ipomæa cymosa* Roem. & Sch. Vern. *Bongki-ripuk*, Miri; *Appa-taru*, Duff.; *Turnaisa*, Kach.; *Sithri-bodu*, Garo; *Goria-loti*, *Kolia-lota*, Ass.; *Mokhamsra-dukha*, Kach.

An extremely variable scandent perennial, somewhat angular, sometimes rooting at the nodes, hairy or glabrous, pubescent when young. *Leaves* 1.5-2.5 by .5-1.5 in., ovate, oblong-lanceolate or elliptic-acuminate, acute or obtuse, entire, angular or toothed, usually pubescent on both surfaces when young on the nerves beneath; lateral nerves prominent, about 4 on either half, sub-parallel; base rounded, cordate

or hastate; petiole .3-.8 in. long, pubescent. *Flowers* in axillary subumbellate cymes. *Calyx* segments .3-.35 in., elliptic-obtuse, aristate. *Corolla* white or with a cream-coloured yellow tinge, about 1-1.25 in. long, pubescent near the apex; tubular, funnel-shaped, slightly lobed. *Capsule* globose, glabrous, .3 in. in diameter. *Seeds* densely clothed with blackish hairs.

GARO HILLS, N. C. HILLS, NOWGONG, KAMRUP, DARRANG, SIBSAGAR.

Leaves are used as vegetable and also for poultice. The climber is tied round the waist to relieve pain.

Flrs. 2-4. Fr. 5-8.

No. 3642 identified at Sibpur I. cymosa is probably I. Kingii = I. cymosa. Var. macra.

Flowers and the leaves are much larger.

2. *Merremia vitifolia* Hallier f. = *Ipomæa vitifolia* Sweet. *Vern.* *Digi-lewa*, Mech; *Toskrai-rikang*, Mik.; *Gajaudi-doukha*, Kach.; *Dijaobideng*, Cach.; *Parnemrang*, Kuki; *Dukhumi-bidu*, Garo.

An extensive twiner, hairy, scarcely woolly. *Leaves* 2-7 in. in diameter, suborbicular or broadly ovate (veins like) usually palmately lobed 5-7, deeply cordate; lobes acute or acuminate, strong, toothed, more hairy above than beneath; petiole .5-4 in. long. *Cymes* 1-7-flowered, pedunculate hairy. *Calyx* segments hairy, 2-7.5 in., accrescent in fruit. *Corolla* pale yellow or purplish, 1.5-2 in. long, glabrous; filaments short. *Capsule* globose, .5 in. in diameter, usually 4-seeded. *Seeds* blackish.

GOALPARA, GARO HILLS, N. C. HILLS, KHASI HILLS.

Flrs. 1-3. Fr. Rainy season.

***Merremia hastata* Hallier f. = *Ipomæa angustifolia* Jacq.**

Diffuse wiry climber. *Leaves* sessile or shortly petioled, 1.5-3 by .3-.75 in., hastate, acuminate membranous, basal lobes often toothed, the rest entire. *Flowers* in cluster of 1-3; peduncles slender, 1.5-3 in. long. *Calyx* segments ovate-lanceolate, fairly acuminate, almost equal. *Corolla* funnel-shaped, pale-yellow with a purplish eye, .75-1 in. long; filaments glabrous, tapering; stigma very large, green. *Fruit*

globose, .2 in. in diameter, obscurely 4-gonous. *Seeds* 4, with large circular hilum, dark brown; testa veined.

K. & J. HILLS.

Haines says flowers from May onwards.

Flrs. & Fr. Cold season.

3. *Merremia cæspitosa* Hallier f.=*Ipomæa linifolia* Blume.

A slender creeper or twiner. *Leaves* 1.2-1.5 by .25-.9 in., linear-oblong, lower ovate-oblong, subcordate, somewhat hastate; petiole .25-.8 in. long. *Flowers* in 3-many flowered axillary cymes; peduncles slender, 1-3 in. long. *Calyx*-segments obtuse, .25 in. long. *Corolla* upto .75 in. long. *Capsule* ovoid, .3 in. long.

KHASI HILLS, MANIPUR, SIBSAGAR.

Flrs. 10-12. Fr. 2.

4. *Merremia chryseides* Hallier f.=*Ipomæa chryseides* Ker-Gawal.

A slender twiner, glabrous, often with small prominence, sometimes slightly hairy at the nodes. *Leaves* usually 1-3 by .5-2 in., ovate-cordate, acute, entire or toothed or shallowly 3-lobed; petiole .7-1.5 in. long. *Flowers* in axillary long pedunculate few flowered cymes. *Corolla* yellow, campanulate, 5-lobed. *Capsule* .25 in. long, somewhat 4-angled, broadly ovoid, transversely wrinkled. *Seeds* pubescent, minutely dotted.

CACHAR (42,412 Clarke).

Flrs. & Fr. Cold season.

13. OPERCULINA Manso.

Operculina Turpethum Manso=*Ipomæa Turpethum* R. Br.

A large herbaceous perennial climber scarcely woody, with milky juice; stem much twisted, softly pubescent, angled, 3-4 winged. *Leaves* usually 2-5 by 1-3 in., upper ones often longer, ovate or oblong, obtuse or subacute, sometimes mucro-

nate, more or less pubescent on both surfaces; lateral nerves 9-12 on either half; base cordate or truncate; petiole 1-3 in. long, pubescent, often winged. *Flowers* large, axillary in few flowered cymes; bracts about 1 in. long, pinkish, deciduous; pedicels thickened in fruit. *Calyx* segments 5, unequal, ovate; outer ones 3 accrescent in fruit, concave, mucronate; inner ones small, membranous, spiculate. *Corolla* white, upto 2 in., sub-campanulate. *Stamens* 5; filaments broadened at base; anthers large at length, contorted. *Ovary* glabrous, 2-celled, 4-ovuled; style filiform; stigma 2, globose. *Capsule* globose, .5-.75 in. across, dehiscent circumsciss or irregular. *Seeds* 4 or fewer, glabrous.

KAMRUP.

It is a purgative, well-known under the name of Turpeth root or Indian Jalap. The Jalap of British Pharmacopœia is the resin of *Ipomœa purga* Hayne. (Haines).

Flrs. 10-12. Fr. 1-2.

14. ERYCIBE Roxb.

Usually large climbing shrubs. *Innovations* ferruginous, pubescent. *Leaves* entire, coriaceous. *Flowers* small in axillary or terminal racemose or paniced cymes; bracts lanceolate, small. *Calyx* 5-cleft; segments sub-equal, coriaceous, persistent, orbicular, adpressed to the base of fruit. *Corolla* white or yellowish; tube short, hairy externally; lobes 5, obcordate, induplicate, contorted in bud. *Stamens* 5, subincluded; filaments short; anthers ovate-lanceolate. *Ovary* 1-celled, 4-ovuled; stigma large, sub-globose or conic, 5 or 10 ridged. *Berry* ovoid or ellipsoid, usually fleshy. *Seeds* solitary, glabrous; albumen scanty, intruded irregularly between the folds of the fleshy cotyledons; radicle inferior.

Cymes in terminal panicles, rarely axillary :—

Branchlets more or less angular. Leaves obovate or obovate-oblong, covered with reddish-brown tomentum when young, abruptly acuminate. Flowers yellow.

1. *E. paniculata*.

Cymes sub-spicate :—

Branchlets angular, rusty-tomentose. Leaves elliptic or lanceolate-acuminate.

2. *E. subspicata*.

Cymes short, axillary, often half as long as the leaves and in elongate terminal panicles :—

Branchlets almost glabrous. 3. *E. glaucescens*.

Cymes short, axillary towards the ends of branches and terminal but scanty paniced :—

Branchlets angular, sparsely pubescent.

Flowers yellowish-white. 4. *E. lævigata*.

Cymes in long terminal ferruginous-tomentose panicles. Leaves oblong-lanceolate, acuminate.

Flowers pale-white. 5. *E. albiflora*.

1. *Erycibe paniculata* Roxb. Vern. Niguni-boal-lota, Ass.

A large evergreen woody climber. *Bark* grey thin; blaze cream coloured; wood with floral design, phlœum pale when first exposed, soon turning deep dirty brown. *Leaves* 3·5·5 by 1·2·2·2 in., ovate-oblong, abruptly acuminate, entire, coriaceous, glabrous, dark glossy green above when mature, pale beneath; lateral nerves 4·6 on either half, arcuate; base acute; petiole ·3·6 in. long. *Flowers* fragrant, yellowish in usually terminal rusty-tomentose, paniced drooping cymes up to 7 in. long; pedicels ·2 in. long. *Calyx* ferruginous-tomentose. *Corolla* campanulate; lobes marginate, crisped. *Stamens* included; filaments dilated at the base; anthers with a curved crown; stigma sessile, sub-globose, often 5-lobed. *Berry* ellipsoid, ·3·5 in. in diameter, black when ripe, pulp dark purple. *Seed* elliptic.

LAKHIMPUR, DARRANG, SIBSAGAR.

Fruit ripens nearly after 12 months. Fruit is sweet and eaten. The bark is given in cholera by Santals (Haines).

Flrs. 2-4.

2. *Erycibe subspicata* Wall.

Branchlets angular, rusty-tomentose. *Leaves* 2·4 by 1·1·8 in., elliptic-lanceolate or broadly elliptic-acuminate, coriaceous, glabrous; lateral nerves 4·5 on either half, slender; base obtuse or acute; petiole ·2·3 in. long. *Flowers* large in subspicate rusty-tomentose, peduncled cymes.

KAMRUP—Gauhati; KHASI HILLS.

Flrs. 4.

3. *Erycibe glaucescens* Wall.

A glabrous diffuse or sub-scandent shrub. *Leaves* 2-3 by .9-1.5 in., elliptic-acuminate, entire, coriaceous, glabrous; lateral nerves 5-6 on either half, rather slender and obscure; base cuneate; petiole .2-.3 in. long; cymes axillary or in terminal panicles. *Flowers* white, fragrant. *Corolla* lobes rusty-pubescent on the back.

CACHAR, SYLHET (Wall No. 1333).

Flrs. 9.

4. *Erycibe lævigata* Wall.

A large straggling or climbing shrub. *Branchlets* sparsely pubescent; older branches dark purplish. *Leaves* 2.5-6 by .8-2 in., elliptic or oblong-elliptic, acuminate, distantly glandular, denticulate, sinuate, coriaceous, glabrous; lateral nerves numerous; midrib impressed above, stout and prominent beneath, tertiaries distinctly and elegantly reticulated; base rounded or cuneate; petiole .3-.5 in. long. *Flowers* yellowish, usually in axillary short panicles. *Berry* globose, .75 in. in diameter.

SIBSAGAR, KHASI HILLS.

Flrs. 12. Fr. 1-2.

5. *Erycibe albiflora* Hallifer f.

A large climber, 22 in. in girth; stem pale purplish; wood on transverse section with floral design. *Leaves* 4-6 by 1.3-2 in., oblong-lanceolate, acuminate, entire, coriaceous, glabrous; lateral nerves 4-6 on either half, conspicuous, arcuate, making an angle of about 30° with the midrib; base cuneate. *Flowers* pale-white in long terminal ferruginous-tomentose panicle. *Calyx* rusty-tomentose externally. *Corolla* bi-lobed; stigma conspicuously 5-lobed like a strand. *Fruit* ovoid, .5 by .3 in.

CACHAR, N. C. HILLS.

Flrs. 11. Fr. 2.

E. peguensis *Prain.*

A small tree; bark dark grey; branchlets angular-tomentose. *Leaves* 2-3 by .8-1 in., lanceolate, entire, bluntly acuminate, coriaceous, glabrous; lateral nerves 5-7 on either half, slender; base acute or rounded, somewhat unequal; petiole about .5 in. long. *Flowers* in terminal panicles. *Calyx* segments coriaceous, more or less orbicular, .1 in. across, pubescent. *Corolla* campanulate, hairy; ovary globose. *Berry* blackish, ovoid, .5 in. long, smooth.

KHASI AND JAINTIA HILLS (3,000 ft.).

Fr. 1.

15. CUSCUTA Linn.

Cuscuta reflexa *Roxb.* Vern. *Jerini-uthri*, *Meitiu-marwei*, Kh.; *Sunya-lota*, Sylh.; *Durimmel*, Garo; *Honboria-loti*, Ass.

A yellowish green glabrous twining parasite; stem minutely and irregularly often purplish verrucose, fleshy, usually forming dense masses on low trees and shrubs. *Flowers* white, waxy, about .35 in. long and .3 in. across, solitary or in irregular cymose clusters, sometimes racemed; racemes up to 1.5 in. long; bracts .1 in., ovate to ovate-oblong, obtuse, narrower and smaller upwards; pedicels minute, up to .1 in., verrucose. *Calyx* deeply 5-partite; lobes ovate, obtuse, .15 in. long, whitish, often purple, verrucose in the back along the middle. *Corolla* subcampanulate; tube slightly ventricose towards the top with 5 oblong fimbriate incurved scales, which are connate at the base near the bottom; lobes 5, imbricate in bud, broadly triangular, reflexed, .15 in. long. *Stamens* 5, inserted at the throat of the corolla tube and alternating with the lobes; filaments minute; anthers introrse. *Ovary* 2-celled; ovules 2 in each cell. *Style* minute; stigma 2, lanceolate. *Capsule* globose, ovoid, irregularly verrucose.

Common throughout the Province.

Destructive to hedges and shrubs. It is used as Veterinary medicine by Indian for poultice on sprains.

Flrs. 10-12. Fr. Cold season.

FAM. 93. SOLANACEÆ.

Herbs or shrubs, erect or climbing. *Leaves* alternate, often in pairs, rarely clustered, entire, lobed or pinnate, exstipulate. *Flowers* usually 5-merous, hermaphrodite, regular, rarely zygomorphic, in terminal or often lateral, axillary or extra-axillary cymes, sometimes solitary or clustered. *Calyx* persistent, sometimes enlarged in fruit. *Corolla* of various shapes, usually plicate in bud or lobes valvate, rarely imbricate; lobes deeply obcordate, so appearing as 10-lobed. *Stamens* epipetalous, isomerous and alternating with the corolla lobes or fewer in zygomorphic flowers; anthers ovate or oblong, dehiscing by apical pores or longitudinally. *Disc* hypogynous, usually distinct. *Ovary* superior, 2-celled, obliquely placed, sometimes with secondary division or reduced; ovules 1, anatropous or slightly amphitropous in peltate placenta; style simple. *Fruit* baccate or capsular, many-seeded, opening by long valves or circumscissile dehiscence. *Seeds* compressed, discoid or sub-reniform; embryo often curved, peripheral, rarely straight; albumen fleshy.

This family is of not much forest interest but comprises many plants, which are officinal in British Pharmacopœia (*Belladonna*, *Hyoscyamus*, *Datura*, *Nicotiana* etc.) and are also of considerable economic importance (potato, tomato, brinjal, chilli, cape goose-berry etc.).

Embryo curved (more than a semicircle) :—

Stamens 5, fertile :—

Ovary 2-locular. Fruit baccate :—

Calyx reticulate, veined, inflated in fruit.

Flowers solitary, axillary, yellowish or white.

Calyx in fruit deeply cleft, minute,
enlarged, 5 angled.

Calyx not greatly enlarged in fruit :—

Flowers 1-3, axillary; filaments longer than the anther.

Flowers cymose, usually extra-axillary.

Leaves not pinnate; filaments shorter

1. Physalis.

2. Nicandra.

3. Capsicum.

- than the anthers, opening by pores or short slit. 4. **Solanum.***
 Leaves pinnate; anthers opening by long slits. 5. **Lycopersicum.**
 Ovary 4-locular. Fruit capsular :—
 Flowers very large, funnel-shaped or tubular. 6. **Datura.**
 Embryo straight or slightly curved :—
 Stamens 5, fertile, exotics :—
 Flowers often zygomorphic. Shrubs.
 Fruits baccate. 7. **Cestrum.**
 Herb. Fruit capsular. 8. **Nicotiana.**

1. PHYSALIS Linn.

Physalis peruviana Linn. The cape goose-berry. Vern. *Soh-podok-rit*, Kh.

A bushy herbaceous annual. *Leaves* 1·5·5 by ·6·3·3 in., ovate-entire, sinuate or shallowly lobed, acute or acuminate, membranous, hairy (probably reduced in cultivation); base cuneate or cordate; petiole 1 in. long. *Flowers* solitary, axillary. *Calyx* campanulate, greatly enlarged and bladder-like and enclosing the fruit. *Corolla* campanulate, ·5 in. across, with 5 large purple spots near the base. *Berry* globose. *Seeds* compressed.

KHASI HILLS (5,000 ft.).

Cultivated.

Flrs. & Fr. 8-10.

2. NICANDRA Adans.

Nicandra physaloides Gærtn.

An annual, glabrous herb. *Leaves* 3-6 by 1·2·5 in., ovate-lanceolate. *Flowers* pretty blue, solitary, 1·1·5 in. across. *Calyx* lobes deeply partite; segments ovate-cordate, much enlarged in fruit and 5-angular. *Corolla* campanulate, 5-lobed. *Ovary* 5-celled; stigma 5-lobed. *Berry* globose, ·5 in. in diameter. *Seeds* many, discoid.

KHASI HILLS—600 ft.

Flrs. & Fr. 8-10.

* Some of the species have been transferred to genus *Lycianthes* Hassl.

3. CAPSICUM Linn.

Herbs or under-shrubs. *Flowers* axillary, solitary or in cluster of 2-3. *Calyx* campanulate, 5-toothed, often obscurely so, usually not enlarged in fruit. *Corolla* lobes 5, valvate. *Anthers* dehiscing longitudinally. *Berry* very variable. *Seeds* discoid, smooth or sub-scabrous.

Capsicum minimum Roxb. Vern. *Soh-mangken-eit-mai*, Kh. Brazil Pepper, apparently wild.

KHASI HILLS, KAMRUP, NOWGONG.

Flrs. Rainy season. Fr. Cold weather.

C. annuum Linn. & *C. frutescens* Linn. are the Chillies.

Cultivated extensively throughout the Province, originally introduced from S. America, often found as escapes.

Chillies are used by Indians medicinally for fever, sore throat, dyspepsia and other diseases.

4. SOLANUM Linn.

Herbs, shrubs or small trees, sometimes climbing, un-
 • armed or spinous, hairs usually stellate. *Flowers* regular (rarely zygomorphous) in 2-chotomous or racemose cymes, often extra axillary; filaments usually shorter than the anthers; anthers connivent in a tube opening by terminal pores or short slit. *Fruit* baccate, globose or elongated. *Seeds* small, very many, discoid; embryo curved, peripheric; cotyledons linear; radicle terete.

Unarmed :—

An annual herb :—

Roots tuberous. 1. *S. tuberosum*.

Roots not tuberous :—

An annual herb. Flowers in umbellate cyme. 2. *S. nigrum*.

Shrub or small tree, densely tomentose. Flowers white in corymbose cymes. 3. *S. verbascifolium*.

Undershrub, glabrous or scarcely puberulous. Inflorescence densely and spirally racemed. 4. *S. spirale*.

Shrub, nearly glabrous. Flowers clustered. Calyx cup-shaped in flowers. *S. subtruncatum*.
 (Transferred to
Lycianthes)

Large shrub or small tree. Flowers purplish in densely stellate woolly racemes. 5. *S. Kurzii*.

A small shrub. Flowers in clusters. Corolla purple-rose to white. Leaves

glabrous or sparsely setulose. (Corolla with 2 glandular pits near the base?).

Armed :—

Leaves usually prickly. Corolla pubescent outside, densely stellate-tomentose :—

Flowers white :—

Leaves prickly. Calyx hirsute. Fruit hispid. 6.

Leaves unarmed or with very few prickles.

Calyx unarmed. Fruit glabrous. .. 7.

Flowers blue :—

Racemes many-flowered. Berry small, globose, yellow. 8.

Racemes few-flowered. Berry large, purple, rarely white or yellow; few prickles on nerves or quite unarmed. .. 9.

Flowers in lateral raceme. Berry size of a pea, quite enclosed in prickly enlarged calyx. Corolla blue. 10.

Flowers in few-flowered raceme. Berry 1 in. in diameter, not quite enclosed in the hirsute (not prickly) calyx. 11.

Armed :—

Anthers long, usually attenuate half way up.

Diffuse herb; prickles long, straight. Flowers blue. Leaves usually twice lobed or sub-pinnatifid. Berry size of a cherry. .. 12.

1. *Solanum tuberosum* Linn. The Potato.

A herbaceous annual; stem obscurely angular. *Leaves* pubescent; branches arising from the axils of the lowest leaves, grows horizontal under ground and wall up into tubers (Potatoes), by heaping earth against the stem, so as to cover more of the lower leaf axils, a large number of axillary shoots are made to become tuber bearing. *Flowers* about 1 in. across, bluish or white in subterminal cymes.

Extensively cultivated in ASSAM, two crops in KHASI HILLS, in the rainy season and in the cold season. In the Valley in the cold season.

2. *Solanum nigrum* Linn. The black nightshade.

A suffrutescent annual herbaceous weed. *Leaves* 1-5 by .5-2 in., ovate-lanceolate or ovate-oblong, entire, sinuate, toothed or lobed, acute or acuminate, thin, glabrous; base narrowed into the petiole, .7 in. long. *Flowers* white, small

S. crassipetalum.
(Transferred to
Lycianthes)

6. *S. ferox.*

7. *S. torvum.*

8. *S. indicum.*

9. *S. Melongena.*

10. *S. barbisetum.*

11. *S. khasianum.*

12. *S. xanthocarpum.*

in sub-umbellate cymes, extra axillary. *Calyx* sparsely puberulous, 5-toothed; segments rounded. *Corolla* glabrous outside, rotate, 5-lobed. *Ovary* glabrous; style bearded at base. *Berry* black, shining, but sometimes yellow or red when ripe, .25-.3 in. in diameter, globose. *Seeds* discoid, minutely pitted.

KHASI HILLS (upto 5,500 ft.).

Flrs. & Fr. 7 (practically throughout the year except cold weather).

In Hindu medicine it is considered a tonic. In Bengal, the leaves are used in fever, diarrhœa and eye diseases.

It is also used in chronic enlargement of spleen and is considered a valuable alterative and diuretic.

3. *Solanum verbascifolium* Linn. Vern. *Khimkha-nagong*, Garo; *Ahom-bhola-arong*, Mik.; *Phuslu*, Misi-mou-jela, Kach.; *Bordap*, Kuki; *Dieng-soh-mong-niang-kadong*, Kh.

A shrub (18'/16''), crown flat; bark greenish grey; stem extremities and inflorescence stellately woolly. *Leaves* 2.5-9 by 2-4 in., elliptic-lanceolate, ovate-lanceolate, acute or acuminate, entire, sub-coriaceous, rather herbaceous, stellately woolly or tomentose, with an unpleasant smell when bruised; base rounded or truncate, rarely cuneate; petiole .5-2 in. long. *Flowers* white, in woolly dense corymbose sub-terminal cymes. *Calyx* cup-shaped; segments short, deltoid, enlarged in but shorter than the fruit. *Corolla* .7 in. in diameter, stellate tomentose outside. *Stamens* on the throat of the corolla; anthers not attenuate dehiscing by apical slits. *Ovary* hairy; style glabrous. *Berry* stellate when young, yellow when ripe, globose, 3.5-4 in. in diameter.

NOWGONG, KAMRUP, GOALPARA, DARRANG, N. C. HILLS, GARO HILLS, KHASI & JAINTIA HILLS.

The leaves and fruit are used in Indian medicine.

Flrs. & Fr. Almost throughout the year.

4. *Solanum spirale* Roxb. Vern. *Titakuchi*, Ass.; *Oko-oing*, Miri; *Lora-tita*, Goalp.; *Soh-jaring*, *Soh-jhari*, Kh.; *Dieng-sa-ryngang-khleindong*, Synt.

An undershrub upto 12 ft. high; stem erect with 1 or 2 sharp ridges. *Leaves* 2-7 by .8-3 in., (each leaf is subtended

by a small leaf often much reduced), elliptic, entire, acute, membranous, glabrous; lateral nerves about 7 on either half; base alternate; petiole .6 in. long. *Flowers* small, in dense spirally arranged racemose extra axillary inflorescence. *Calyx* .16 in. across, adpressed to base of fruit (not reflexed). *Corolla* .6 in. across, almost glabrous, deeply lobed. *Ripe* berries orange-red, globose, .3 in. in diameter. *Seeds* smooth, .12 in. in diameter.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, DARRANG, GOAL-PARA, KHASI & JAINTIA HILLS (upto 5,000 ft.).

The root is given as a narcotic and diuretic in doses of from gr. $\frac{1}{4}$ to grs. VIII (Irvine).

Fruit eaten both raw and cooked. Leaves are also eaten cooked.

Flrs. 5-9. Fr. Cold season.

5. *Solanum Kurzii* Br. Vern. *Khim-kha*, Garo.

A shrub 3-4 ft. high, extremities and leaves densely stellate-tomentose. *Leaves* 1-3.5 by .5-2.5 in., ovate, entire or more or less irregularly lobed, more densely and stellately woolly beneath, rather herbaceous; base rounded or acute; petiole .5-1.3 in. long. *Flowers* small in rusty woolly stellately pubescent sub-terminal racemose cymes. *Calyx* stellately pubescent; teeth oblong-lanceolate, slightly enlarged in fruit. *Corolla* deeply divided, oblong-lanceolate, 1 lobe longer than the other 4, stellately pubescent outside. *Style* produced beyond the anthers. *Berry* glabrous, globose, .25-.3 in. in diameter, bitter.

GARO HILLS (1,200 ft.).

Fruit is eaten cooked.

Flrs. & Fr. 3.

6. *Solanum ferox* Linn.

A coarse undershrub; young parts densely brown, stellately woolly and prickly. *Leaves* 5-9 by 3.7 in., ovate or suborbicular, rather shallowly lobed; lobes blunt, rather membranous with stellate hairs beneath as well as above, with compound prickles on the nerves and midrib; base truncate; petiole upto 3.5 in. long. *Flowers* in short lateral

cymes. *Calyx* densely hirsute; segments ovate, acute. *Corolla* densely villous outside. *Berry* globose, about 1 in. in diameter, hispid.

ASSAM (F.B.I.), KHASI & JAINTIA HILLS.

The leaves are used medicinally (Watt).

Flrs. & Fr. Cold season.

7. *Solanum torvum* Swartz. Vern. *Bekhoir*, Sylh.; *Bongali-aheso-arong*, Mik.; *Dieng-soh-nang*, Kh.; *Bhit-tita*, Ass.; *Hatibhekuri*, Sib.; *Khem-khatai-baphang*, Kach.; *Tokra-kur*, Lush.; *Khanga*, Manip.; *Konthai-Raja*, Mech; *Khing-gathai-phang*, Kach.; *Kham-chok-raling*, Kuki.

A shrub 8-12 ft. high, sparingly armed, sparsely stellate pubescent. *Leaves* 2-6 by 1·5-5 in., ovate, serrate or lobed, shortly acuminate, membranous, sparsely stellate-pubescent above, more closely so beneath; base unequal or rounded; petiole ·5-1 in. long. *Flowers* white, about ·7-1 in. across, in dense lateral usually extra-axillary often branched, unarmed cymes; pedicels slender, ·4 in. long, upto ·75 in. in fruit, pubescent. *Calyx* ·2 in. across, unarmed, abruptly apiculate. *Corolla* stellate, pubescent outside; lobes spreading, linear-oblong or lanceolate. *Berry* globose, ·5·6 in. in diameter, seated on a persistent calyx (not accrescent) and the thickened pedicel.

SYLHET, CACHAR, N. C. HILLS, GOALPARA, SIBSAGAR, LAKHIMPUR, NOWGONG, DARRANG, KAMRUP. KHASI & JAINTIA HILLS.

Flrs. & Fr. 9-10.

8. *Solanum indicum* Linn. Vern. *Soh-mongken-sning*, *Soh-ngang*, Kh.; *Lobo-hapi*, Mik.; *Bhot-bengna*, *Deur-tita*, *Tit-bhakuri*, *Bhekuri*, Ass.; *Heso-bongai-arong*, *Hecho*, Mik.

A shrub upto 10 ft. high; branches herbaceous. *Bark* smooth, pale brown or greenish grey, warty, armed; blaze greenish; often with curved prickles; young parts and inflorescence thickly stellate-tomentose. *Leaves* 2-5 by 1-3·5 in. ovate or oblong, serrate or obtusely lobed; lobes often sub-

acute or acute, thinly herbaceous, stellate-tomentose, green above, grey or dirty tomentose beneath; prominently on the nerves and midrib beneath; lateral nerves 3-5 on either half; base usually truncate, unequal; petiole upto 1.5 in. long. *Flowers* bluish purple, .5-.75 in. across, in extra-axillary or sub-terminal racemose cymes; pedicels and peduncle often prickly; pedicels .8 in. long, thickened above. *Calyx* stellate, pubescent outside, usually prickly. *Corolla* tomentose outside; lobes reflexed. *Fruit* globose, smooth, 1-1.25 in. in diameter, yellow.

SIBSAGAR, N.-E. F. TRACT, DARRANG, NOWGONG, KAMRUP, N. C. HILLS, GOALPARA, KHASI & JAINTIA HILLS.

Leaves used for fermenting liquor. Fruit is eaten as vegetable and used in febrile affections and colics. Root is efficacious in toothache and also useful as an expectorant, cough and catarrhal affections.

Flrs. 6-10. Fr. Cold season.

9. *Solanum Melongena* Linn. Vern. *The brinjal*, *Soh-baingon*, Kh.; *Bengna*, Ass.

In cultivation the fruits grow to a very great size and prickles are reduced, many distinct forms or races are recognised.

The fruits are eaten cooked as a vegetable, the seeds are used as a stimulant and the leaves as a narcotic (Atkinson).

Cultivated throughout ASSAM.

Flrs. & Fr. throughout the year.

10. *Solanum barbisetum* Nees. Vern. *Soh-podok*, *Shiah*, Kh.

An undershrub. *Leaves* 2-7.5 by 1-5 in., pinnatifid, prickly on the nerves and midrib, woolly on both surfaces; petiole upto 2 in. long, prickly. *Flowers* medium sized, in lax extra-axillary or sub-terminal racemes. *Calyx* ovate-lanceolate, hairy. *Corolla* lobes linear-oblong, acute. *Berry* globose, .6 in. in diameter, glabrous, enclosed in the prickly accrescent calyx. *Seeds* rugose, but not villous.

KHASI HILLS 5,000 ft.

Fruit eaten when ripe.

Flrs. & Fr. 8-5.

11. *Solanum khasianum* Clarke.

A stout undershrub 3-4 ft. high; young parts densely yellowish, hirsute and prickly. *Leaves* 1-5 by .8-4.5 in., ovate-acute, lobed; lobes acute, rather coriaceous, hirsute and prickly on both surfaces, specially along the midrib and the nerves; base truncate or sub-cordate; petiole upto 2 in. long. *Inflorescence* lateral, few flowered; pedicels upto 1 in. in fruit. *Calyx* hirsute (not prickly); segments lanceolate. *Corolla* .35 in. across; lobes lanceolate. *Stamens* symmetrical. *Berry* yellowish, globose, about 1 in. in diameter.

KHASI HILLS 5,000 ft. (Mann's Nos. 46 & 50).

Flrs. 7. Fr. 11.

12. *Solanum xanthocarpum* Schrad. & Wendl.
Vern. *Dieng-sa-pydok-bak-thang*,=(bitter brinjals), Synt.;
Birkulitita, Ass.

A perennial herb. *Stem* and leave both above and below with sharp straight prickles, also pubescent. *Leaves* pinnatifid. *Flowers* deep blue, 1-1.5 in. across, in few flowered cymes. *Calyx* lobes recurved, scarcely accrescent. *Fruit* globose, yellow when ripe, upto 1 in. in diameter, variegated or green when young.

GOALPARA, KHASI & JAINTIA HILLS.

The fruits are eaten as vegetable. The plant is medicinal and is much esteemed as an expectorant and diuretic in bronchial disease.

The root is largely used in catarrhal and febrile affection.

Flrs. & Fr. 12-2.

Solanum sisymbriifolium Lam. Var. *Balbissii* (Dunn).

A viscid undershrub armed with prickles. *Leaves* pinnatifid or twice pinnatifid, armed with prickles. *Flowers* white or violet in racemed clusters. *Calyx* tube inflated, cup-shaped, accrescent and enclosing the berry, but ultimately the segments are reflexed.

An escape (Native of AMERICA).

Flrs. Cold season. Fr. 4-5.

The following species which originally belonged to the Genus *Solanum* Linn., have now been transferred to the Genus *Lycianthes* Hassl.

acute or acute, thinly herbaceous, stellate-tomentose, green above, grey or dirty tomentose beneath; prominently on the nerves and midrib beneath; lateral nerves 3-5 on either half; base usually truncate, unequal; petiole upto 1.5 in. long. *Flowers* bluish purple, .5-.75 in. across, in extra-axillary or sub-terminal racemose cymes; pedicels and peduncle often prickly; pedicels .8 in. long, thickened above. *Calyx* stellate, pubescent outside, usually prickly. *Corolla* tomentose outside; lobes reflexed. *Fruit* globose, smooth, 1-1.25 in. in diameter, yellow.

SIBSAGAR, N.-E. F. TRACT, DARRANG, NOWGONG, KAMRUP, N. C. HILLS, GOALPARA, KHASI & JAINTIA HILLS.

Leaves used for fermenting liquor. Fruit is eaten as vegetable and used in febrile affections and colics. Root is efficacious in toothache and also useful as an expectorant, cough and catarrhal affections.

Flrs. 6-10. Fr. Cold season.

9. *Solanum Melongena* Linn. Vern. *The brinjal, Soh-baingon, Kh.; Bengna, Ass.*

In cultivation the fruits grow to a very great size and prickles are reduced, many distinct forms or races are recognised.

The fruits are eaten cooked as a vegetable, the seeds are used as a stimulant and the leaves as a narcotic (Atkinson).

Cultivated throughout ASSAM.

Flrs. & Fr. throughout the year.

10. *Solanum barbisetum* Nees. Vern. *Soh-podok, Shiah, Kh.*

An undershrub. *Leaves* 2-7.5 by 1-5 in., pinnatifid, prickly on the nerves and midrib, woolly on both surfaces; petiole upto 2 in. long, prickly. *Flowers* medium sized, in lax extra-axillary or sub-terminal racemes. *Calyx* ovate-lanceolate, hairy. *Corolla* lobes linear-oblong, acute. *Berry* globose, .6 in. in diameter, glabrous, enclosed in the prickly accrescent calyx. *Seeds* rugose, but not villous.

KHASI HILLS 5,000 ft.
Fruit eaten when ripe.

Flrs. & Fr. 8-5.

11. *Solanum khasianum* Clarke.

A stout undershrub 3-4 ft. high; young parts densely yellowish, hirsute and prickly. *Leaves* 1-5 by .8-4.5 in., ovate-acute, lobed; lobes acute, rather coriaceous, hirsute and prickly on both surfaces, specially along the midrib and the nerves; base truncate or sub-cordate; petiole upto 2 in. long. *Inflorescence* lateral, few flowered; pedicels upto 1 in. in fruit. *Calyx* hirsute (not prickly); segments lanceolate. *Corolla* .35 in. across; lobes lanceolate. *Stamens* symmetrical. *Berry* yellowish, globose, about 1 in. in diameter.

KHASI HILLS 5,000 ft. (Mann's Nos. 46 & 50).

Flrs. 7. Fr. 11.

12. *Solanum xanthocarpum* Schrad. & Wendl.
Vern. *Dieng-sa-pydok-bak-thang*,=(bitter brinjals), Synt.;
Birkulitita, Ass.

A perennial herb. *Stem* and leave both above and below with sharp straight prickles, also pubescent. *Leaves* pinnatifid. *Flowers* deep blue, 1-1.5 in. across, in few flowered cymes. *Calyx* lobes recurved, scarcely accrescent. *Fruit* globose, yellow when ripe, upto 1 in. in diameter, variegated or green when young.

GOALPARA, KHASI & JAINTIA HILLS.

The fruits are eaten as vegetable. The plant is medicinal and is much esteemed as an expectorant and diuretic in bronchial disease.

The root is largely used in catarrhal and febrile affection.

Flrs. & Fr. 12-2.

Solanum sisymbriifolium Lam. Var. *Balbissii* (Dunn).

A viscid undershrub armed with prickles. *Leaves* pinnatifid or twice pinnatifid, armed with prickles. *Flowers* white or violet in racemed clusters. *Calyx* tube inflated, cup-shaped, accrescent and enclosing the berry, but ultimately the segments are reflexed.

An escape (Native of AMERICA).

Flrs. Cold season. Fr. 4-5.

The following species which originally belonged to the Genus *Solanum* Linn., have now been transferred to the Genus *Lycianthes* Hassl.

Lycianthes subtruncata Hassl. (*Solanum subtruncatum* Wall.)
Vern. *Bonbhekuri*, Ass.

A shrub about 7 ft. high, sometimes straggling. *Leaves* 1-5 by .6-1.5 in., lanceolate, elliptic-lanceolate, entire, acuminate, membranous, glabrous, (Khasi hills specimens) puberulous below (Sibsagar collection); base acute or cuneate; petiole .2-.3 in. long. *Flowers* bluish-white in axillary clusters; pedicels upto .6 in. long. *Calyx* cup-shaped, almost entire, saucer-shaped in fruit, .2 in. across; teeth obscure. *Corolla* glabrous outside, .25 in. long, 5-lobed. *Stamens* yellow. *Berry* globose, glabrous, .25 in. in diameter.

SIBSAGAR, KHASI HILLS.

Flrs. & Fr. 7-12.

L. pachypetala Hassl. (*Solanum crassipetalum* Wall.)

A shrub. *Leaves* 4.5-6 by 1.2-2.5 in., elliptic-lanceolate, entire, acuminate, membranous, almost glabrous; lateral nerves distinct but slender, about 7 on either half; base narrowed into the petiole, upto .8 in. long. *Flowers* in axillary clusters; pedicels .5-.7 in. long. *Calyx* cup-shaped with linear triangular teeth, glabrous. *Corolla* lobes oblong, acute, ridged or veined. *Berry* ovoid, .25 in. in diameter, glabrous, beaked.

KHASI HILLS. (Mann's collection No. 136).

Flrs. 8-9. Fr. Cold season.

L. macrodon Hassl. (*Solanum macrodon* Wall.)

A small shrub. *Leaves* upto 6 in. long, elliptic-lanceolate, entire, acuminate, setulose above; base narrowed into the petiole .1-.75 in. *Flowers* in cymes (2-8 rarely, solitary). *Calyx* teeth .16 in., linear, hispidulous. *Corolla* .3-.5 in.; lobes purplish or light pinkish with 2 glandular spots near the base, oblong-acute. *Berry* .25 in. across, globose. *Seeds* .1 in. across, more or less triangular, smooth.

KHASI HILLS (3-5,000 ft.). (F.B.I. IV. 232).

5. LYCOPERSICUM Miller.

Lycopersicum esculentum Mill. The tomato.

A pubescent herb. *Leaves* irregularly pinnate, often 2-pinnate-serrate. *Flowers* yellowish in few flowered cymes. *Fruit* red or yellowish.

Native of SOUTH AMERICA. Cultivated throughout the Province, wild in N. C. HILLS (U. Kanjilal's No. 5573).

Flrs. & Fr. Throughout the year.

6. DATURA Linn.

Coarse shrub like herb, rank scented. *Leaves* large, simple, entire, sinuate or toothed. *Flowers* large, white or purple, solitary. *Calyx* elongate, tubular, 5-toothed, often 5-ribbed. *Corolla* tubular, funnel-shaped; limb plicate. *Stamens* attached near the base of the corolla, included; anthers dehiscing longitudinally. *Ovary* 2 or spuriously 4-celled. *Fruit* usually capsular, often spinous, 4-valved or irregularly breaking up. *Seeds* many, compressed, rugose; embryo peripheric.

Flowers purple or white, 2·5-5 in., glabrous, deeply 4-valved :—

Fruit prickly, spines more or less sharp. .. 1. *D. Stramonium*.
Flowers white or purple. 5-7 in.:—

Fruit globose, irregularly breaking up; spines blunt. 2. *D. fastuosa*.

1. *Datura Stramonium* Linn.

A coarse annual; stem green or purplish. *Leaves* 3·7·5 by 1·5-5 in., sinuate or obscurely lobed, sparingly hairy on the nerves beneath; petiole 3-1 in. long. *Calyx* tubular, 5-angled. *Capsule* dehiscent, deeply 5-valved; spines very sharp.

NOWGONG, KHASI HILLS (5,000 ft.).

Official in both Pharmacopœia (*I. M. Plant*).

Flrs. & Fr. Rainy season.

Var. *Tatula* Willd., flowers purplish without and within.

The young fruits are said to be sedative and slightly intoxicating (Ainslie).

KHASI & JAINTIA HILLS (6,000 ft.).

Flrs. & Fr. Rainy season.

2. *Datura fastuosa* Linn.

Attains about 5 ft., almost glabrous. *Leaves* 3-8 by 1·3-3·5 in. long, ovate-acute, sinuate, obtusely lobed or

toothed. *Flowers* 5-7 in. *Corolla* usually purplish outside; lobes with acuminate lips. *Fruit* nodding.

KHASI HILLS (5,000 ft.).

The seeds, leaves and fruit juice are narcotic, anodynes and anti-spasmodic. The seeds constitute a powerful poison. An alkaloid daturine is useful as a substitute for Belladonna (*I. M. Plant*).

Flrs. 6.

7. CESTRUM Linn.

Cestrum nocturnum Linn. The lady of the Night. *Hasnahana*, Beng.

A straggling shrub. *Leaves* .5 by 1.5 in., lanceolate. *Flowers* very fragrant at night, greenish-yellow, tubular, funnel-shaped in panicked cymes.

Cultivated throughout the Province.

C. fasciculatum Miers. Also cultivated in KHASI HILLS.

Cyphomandra betacea Send. The tree tomato, native of S. AMERICA. Cultivated in KHASI HILLS.

Browallia, *Schizanthus* and *Petunia* are the well-known garden plants.

8. NICOTIANA Linn.

Nicotiana plumbaginifolia Viv. Vern. *Ululai*, Ass. .

A hairy herbaceous weed about 2 feet high; stems slender. leafy. *Leaves* sessile, semi-amplexicaul, various, oblong-lanceolate to obovate-spathulate, entire or undulate, glabrescent. *Flowers* whitish in terminal racemes. *Calyx* .4-.5 in.; segments linear-lanceolate. *Corolla* salver-shaped. *Capsule* .4 in., ovate, glabrous; seeds minutely rugose.

SIBSAGAR (Brahmaputra Bank).

An occasional wild weed (Native of MEXICO and WEST INDIES).

Flrs. & Fr. Hot season.

N. Tabacum Linn. Tobacco.

An erect glandular pubescent herb. *Leaves* large, ovate-oblong or elliptic, acuminate, pubescent. *Flowers* 1.5-2 in. long, rosy or reddish, bracteate, usually in many flowered panicked racemes. *Calyx*

·4·5 in. long; segments lanceolate-acute, unequal. *Corolla* ·7 in. across; throat inflated; lobes spreading; capsule ·6·7 in. long with the slightly accrescent calyx.

Native of AMERICA; cultivated in all the warmer districts of the Province.

KHASI HILLS (cultivated in Government garden).

The tobacco of commerce.

Flrs. Hot season.

***Lycium europæum* Linn.**

A spinous, nearly glabrous shrub. *Leaves* often fascicled in dwarf shoots, very variable, oblong-lanceolate. *Flowers* purplish or whitish, solitary or in fascicles. *Calyx* irregularly 5-toothed. *Corolla* ·5 in., lobes usually 5, imbricate. *Filaments* glabrous. *Ovary* 2-celled; style filiform; stigma sub-capitate. *Berry* sub-globose, bright red, ·15·25 in. in diameter.

KHASI HILLS (G. Mann's No. 111).

FAM. 94. SCROPHULARIACEÆ.

Usually herbs, often semi-parasitic. *Leaves* simple, alternate, opposite or whorled, sometimes gland-dotted, ex-stipulate. *Flowers* bisexual, more or less zygomorphic, solitary, axillary in racemes or spikes or in cymes, often united into complex inflorescences. *Calyx* usually persistent; segments usually 5, (rarely 4), æstivation various. *Corolla* 4·5-lobed, medianly zygomorphic, sometimes nearly regular, often 2-lipped. *Stamens* usually 4, didynamous or sub-equal with or without staminodes; anthers various, 1 or 2-celled. *Disc* annular, cupular or glandular. *Ovary* superior, 2-celled, medianly placed placenta axile; style simple or bilobed; stigma capitellate or dilated, occasionally bilobed or 2-lamellate; ovules usually many, rarely few, anatropous or amphitropous. *Fruit* surmounted by the persistent calyx,

usually a capsule, rarely baccate. *Seeds* usually numerous, small, albuminous; embryo straight or curved.

Corolla bilabiate, broad and saccate at base, all leaves or the lower only opposite.

1. **Antirrhinum.**

Corolla tubular (not saccate or spurred) :—

Anthers confluent :—

Capsule septicidal :—

Calyx 5-fid, herb. 2. **Scrophularia.**

Calyx 3-4-fid, tree. 3. **Wightia.**

Anthers contiguous :—

Capsule loculicidally 2-valved. 4. **Mazus.**

Anther-cells separate. Stamens 4, included :—

Calyx campanulate, 5-fid. Capsule 2-valved, loculicidal. 5. **Lindenbergia.**

Calyx segments equal, sometimes very enlarged in fruit. Stamens all perfect. Capsule septate or loculicidal. Seeds angular. 6. **Limnophila.**

Anthers conniving or cohering in pairs :—

Calyx segments 5, narrow; stamens 2 perfect; capsule long. 7. **Bonnaya.**

Corolla sub-rotate :—

Anthers sagittate or horse shoe-shaped.

Stamens as many as corolla lobes :—

Calyx segments 5; corolla 5-lobed, creeping herbs. 8. **Hemiphragma.**

Calyx 4-5-partite; corolla 4-lobed; erect herb. 9. **Scoparia.**

Corolla spreading :—

Anther-cells 2, distinct. Calyx lobes valvate, campanulate. Corolla oblique. Spikes bracteate, root parasite. 10. **Alectra.**

Corolla 5-merous; tube dilated above; lobes broad, subequal :—

Anther-cells imperfect, one cell stipitate and empty. Calyx campanulate, 5-toothed. Herbs. 11. **Sopubi-**

Corolla bilabiate :—

Anther-cells distinct; ovules more than 2 in each cell :—

Calyx segments 2-5, margins of hood of corolla straight. 12. **Pedicularis.**

1. ANTIRRHINUM Linn.

Antirrhinum majus Linn. The Snapdragon, commonly cultivated in gardens.

Flrs. & Fr. Almost throughout the year.

2. SCROPHULARIA Linn.

Scrophularia elatior Benth.

A tall, stout perennial, semi-woody. *Leaves* ovate-elliptic or lanceolate. *Flowers* in large much branched paniced cymes. *Calyx* deeply partite; segments ovate-lanceolate, persistent, about half the length of the fruit. *Capsule* ovoid, beaked.

KHASI HILLS (5,000 ft.).

Fr. 7.

Brandisia rosea W. W. Smith.

An erect or sub-erect shrub; branches densely white, stellate-tomentose. *Leaves* 1·5-2 by ·4-·6 in., lanceolate, somewhat chartaceous, acute, sparsely stellately puberulous above or glabrescent, white tomentose beneath; nerves impressed above; base cuneate; petiole ·1-·2 in. long. *Flowers* rosy, axillary. *Calyx* campanulate, ·3-·4 in. long. *Corolla* ·8-1 in. long, tubulose, curved; tube ·2-·3 in. across, glabrous inside; lobes ·2 in. long, emarginate. *Anthers* densely barbate. *Ovary* densely tomentose; style somewhat pilose.

3. WIGHTIA Wall.

Wightia gigantea Wall. Vern. Ka-slang, Kh.

A large evergreen epiphytic tree clasping the boles of tree with horizontal ærial roots. *Leaves* 5·5-7·5 by 3-5 in., elliptic or ovate-elliptic, acute or obtuse, coriaceous, glabrous; lateral nerves oblique, 6-7 on either half; base cuneate or rounded; petiole 1-1·5 in. long. *Flowers* pinkish in axillary dense-forked thyrsoid cymes. *Calyx* short. *Corolla* 1 in. long, mealy. *Stamens* exserted. *Capsule* 1·5 by ·75 in., ovoid.

KHASI HILLS (3,200), MANIPUR.

Flrs. 10-11. Fr. 3.

4. MAZUS Lour.

Mazus rugosus Lour.

A small prostrate herb growing in wet localities. *Branches* hairy or pubescent. *Leaves* mostly radical, ·3-1·8

by 2·4 in., almost sessile. *Flowers* pale blue or white in scapiform racemes.

KHASI HILLS, upto 6,000 ft.

Flrs. & Fr. practically throughout the year.

5. LINDENBERGIA Lehm.

Lindenbergia Griffithii Hk. f.

A perennial about 6-8 ft. high, shrubby, silky-villous. *Leaves* 1·5-5 by 1·5 in., ovate-lanceolate, acuminate, pubescent above; petiole 1·4 in. long. *Flowers* in axillary or terminal racemes; corolla purplish-brown, hairy. *Lip* of corolla yellow spotted. *Capsule* ovoid, turgid.

KAMRUP.

Flrs. 1. Fr. Hot season.

L. ruderalis (Retz.) Z.O.=*L. urticæfolia* Lehm.

An annual pubescent herb with aromatic odour, upto 6 in. high. *Leaves* 5-1·5 by 2·8 in., membranous; petiole 7 in. long. *Capsule* ovoid, pubescent.

KHASI HILLS, upto 5,000 ft.

The juice is used in chronic bronchites, also applied in skin eruptions mixed with coriander (*I. M. P.*).

Flrs. 8. Fr. Cold season.

L. Hookeri Clarke ex. Hook. f.

A slender, loose bushy shrub, almost glabrous. *Leaves* 2-3 in. long, ovate-acuminate, coarsely serrate, pubescent; base cuneate; petiole 25-3 in. long. *Flowers* spicate (not showy). *Calyx* segments acute. *Corolla* 1 in. long, pubescent; tube long, lower lip bright-yellow, lower dull with brown flesh. *Anther* cells sausage-shaped. *Ovary* glabrous.

ASSAM, Lohit Valley and Delai Valley, (Kew Bulletin 1934). (F.B.I. IV, 261).

Flrs. & Fr. Cold season.

L. philipinensis Benth.

A tall, erect, herb, 2-3 feet high. *Leaves* 2-4 in. long, ovate-lanceolate or ovate-acute, dentate; petiole long, about half the length of the blade. *Flowers* in rigid densely flowered spike or racemes. *Calyx* longer than the bracts; segments ovate-lanceolate, acuminate.

Corolla .25-.6 in. long, pubescent. *Ovary* villous. *Capsule* lanceolate with exserted tip.

NAGA HILLS. (F.B.I. IV, 261).

Flrs. 1-3. Fr. 4-5.

6. LIMNOPHILA Br.

***Limnophila chinensis* (Osb.) Merr.=*L. hirsuta* Benth.**

Herbaceous plant about 1 foot high or more, thick with large vertical air chambers, hairy. *Leaves* .5-1.5 by .2-.5 in., sessile, opposite or ternate. *Flowers* solitary, axillary or the upper somewhat corymbosely racemose; pedicels with spreading hairs. *Calyx* hirsute, longer than the capsule, 5-partite, .25 in. long. *Corolla* tube .5 in. long, greenish-brown or brownish-white; lobes 4, light purplish; upper lobe undivided. *Stamens* 4, 2-long, 2-short. *Stigma* lamellose. *Capsule* oblong. *Seeds* angular.

KHASI & JAINTIA HILLS, in wet plains.

Flrs. & Fr. 11.

***L. indica* (Linn.) Druce=*L. gratioloides* Br.**

A small herb growing in swamps and wet localities with a turpentine smell. *Leaves* small, whorled, pinnatifid. *Flowers* usually solitary, axillary; pedicels larger than the calyx. *Calyx* hemispheric in fruit. *Corolla* .3 in.

ASSAM.

It is considered to be an antiseptic by the Hindus; also used in dysentery combined with ginger, cumin and other aromatics. Liniment with cocoanut oil is used in elephantiasis (I.M.P.).

Flrs. 4.

L. sessiliflora Blume also occurs in the province.

***Curanga amara* Juss.**

A glabrous straggling annual. *Leaves* opposite, 1.5-2.5 by .9-1.2 in., ovate, crenate, rather obtuse, membranous, glabrous; lateral nerves 5-8 on either half, oblique, arcuate; base unequal sided; petiole upto .7 in. long. *Flowers* in terminal or pseudo-axillary racemes. *Calyx* segments 4; lower, much enlarged (rather inflated) in fruit. *Corolla* upper lip notched, lower 3-fid. *Stamens* 2. *Capsule* almost orbicular, compressed, septicidal, about .3 by .5 in., enveloped in the enlarged calyx. *Seeds* rugose.

NOWGONG (Diphu), CACHAR, MISHMI HILLS.

Flrs. Hot season. Fr. 7.

7. BONNAYA Link et Otto.

Bonnaya reptans Spreng. = *Ilysanthes ciliata* (Colsm) O. Ktze. Vern. *Sam-tham-lang*, *Sam-gichhok*, Garo.

A weed on roadside, trailing. *Leaves* opposite, .5-2 by .3-.8 in., ovate-oblong, sharply serrate; petiole .1-.5 in. long. *Flowers* in racemes; pedicels short, ebracteolate. *Corolla* purplish, .75 in. long. *Capsule* very slender, about 1 in. long, much longer than the calyx.

LAKHIMPUR, GARO HILLS.

Flrs. & Fr. 10-3.

8. HEMIPHRAGMA Wall.

Hemiphragma heterophyllum Wall.

A pubescent herb; stem slender, loosely tufted, prostrate. *Leaves* dimorphic; stem leaves opposite, .3-.5 by .2-.3 in., orbicular, cordate, short petioled; bracts linear, tufted, .5 in. long or less acute, sessile. *Flowers* pinkish, .3 in. across, axillary, solitary. *Calyx* 5-partite. *Corolla* tube slender, short; lobes 5, spreading, broad, nearly equal. *Stamens* 4, equal. *Fruit* capsular, 2-valved, ultimately septicidal, black, shining.

KHASI HILLS (5,500 ft.)

Flrs. 8. Fr. 12.

9. SCOPARIA Linn.

Scoparia dulcis Linn.

A branching erect annual 2 ft. high or more, semi-woody, foetid. *Leavss* opposite or ternately whorled, .5-1 by .11-.3 in., rhomboid or elliptic, serrate, punctate, sessile. *Flowers* small, axillary, ebracteolate. *Calyx* segments imbricate in bud, 3-nerved; shorter than the capsule. *Corolla* white, .13 in. across; throat densely bearded. *Filaments* woolly at base. *Capsule* small, globose, .14 in. in diameter, septicidal. *Seeds* many, obovoid, angled, scrobiculate.

CACHAR, KHASI & JAINTIA HILLS (5,000 ft.).

Flrs. & Fr. 6-1.

Veronica cana Wall.

A perennial herb; root-stock woody, creeping; stem 4-12 in. high, erect. *Leaves* 1-2 in. long, ovate or ovate-cordate, crenate, pubescent or glabrate; petiole .5-.6 in. long. *Flowers* blue, .5 in. across in axillary racemes. *Calyx* segments unequal, linear-oblong. *Capsule* .25-.3 in. across, broadly deltoid, notched at the top.

ASSAM. (F.B.I. IV, 295).

Flrs. 6-7. Fr. 10-11.

V. capitata Benth.

A pubescent annual with perennial roots. *Leaves* sessile or shortly petioled, .5-1 in. long, rounded, ovate, or shortly oblong, obtuse, crenate-serrate or subentire, pubescent; base rounded. *Flowers* in terminal, sessile, villous umbels or heads. *Calyx* segments .16 in. long, spatulate. *Corolla* .25 in. across, blue. *Capsule* .16 in. across, obcordate, ciliate.

ASSAM. (F.B.I. IV, 295).

Flrs. 7-8. Fr. 10.

V. javanica Bl.

A much branched pubescent annual. *Leaves* .7-1.4 by .5-.9 in., ovate, obtuse or acute, crenately serrate, more or less pubescent; base truncate, subcordate or rounded; petiole short, about .1 in. long. *Flowers* in few flowered racemes, terminal, axillary. *Corolla* .2-.3 in. across. *Capsule* pubescent.

KHASI HILLS (5,000 ft.).

Flrs. & Fr. 12-2.

V. talaumifolia Hk. f. Var. *hirsuta* Fischer.

A tree. *Leaves* large, obovate-lanceolate, acute, entire or remotely dentate, glabrous above, pubescent on the nerves beneath, petiolate; base long, attenuate. *Head* 7-12 flowered. *Corolla* glabrous towards the apex. *Achenes* 10-costate, glabrous.

ASSAM.

Flrs. Cold season.

10. ALECTRA Thunb.**Alectra indica** Benth.

A herb, about 1 foot high or more. *Leaves* upper alternate, lower opposite or sub-opposite, .5-1.5 by .2-.6 in.,

almost sessile, lanceolate or oblanceolate, 3-nerved. *Flowers* yellow, solitary, axillary, very shortly pedicelled; bracts 2, filiform, .25-.3 in. long. *Calyx* persistent, 5-fid, 10-ribbed; segments deltoid, acute, keeled, pubescent outside, connecting the fruit. *Corolla* limb oblique, sub-equally 5-lobed; lobes spreading, the outer lower in bud, yellow marked inside, each lobe with 3 straight brownish nerves. *Stamens* 4, didynamous. *Stigma* fusiform, fleshy. *Seeds* numerous on fleshy axile placentas; epicarp scarious.

KHASI HILLS (5,000 ft.).

Flrs. & Fr. 10-11.

11. SOPUBIA Ham.

Sopubia trifida Ham.

An erect herb. *Leaves* .5-1 in., linear or 3-fid. *Flowers* yellowish; pedicels .5-.75 in. *Calyx* woolly within. *Corolla* sub-rotate. *Stamens* didynamous; anthers meeting in pairs. *Capsule* ovoid, loculicidal. *Seeds* numerous.

KHASI HILLS (5,000 ft.).

Flrs. 5-6. Fr. 10.

12. PEDICULARIS Linn.

Pedicularis gracilis Wall.

Shrubby, much branched, upto 2 ft. long, 4 lines of hairs running down the stem. *Leaves* whorled, .3-.8 in., oblong-lanceolate, deeply pinnatifid, glabrous. *Flowers* incurved behind, pink, sessile, axillary, solitary or racemed. *Corolla* .5 in. long; tube scarcely longer than the calyx; beak nearly straight. *Capsule* .3-.5 in. long, oblong, acute, many seeded.

KHASI & JAINTIA HILLS (6,000 ft.).

Flrs. 10.

P. Clarkei Hk. f., *P. carnosa* Wall., *P. Maximowiczii* Krasn. Benth., *P. Brandisii* Benth., *P. fragilis* Benth., also occur in the Province.

P. curvipes *Hk. f.*

A slender glabrous herb; branches flexuous. *Leaves* .4-1.5 by .2-.8 in., pinnatifid, oblong; lobes again incised; petiole .3-.7 in. long. *Flowers* axillary; pedicels .3-.5 in. long. *Calyx* campanulate. *Corolla* bilabiate; lower lobes spreading. *Capsule* slightly oblique, oblong, pendulous.

NAGA HILLS (10,000 ft.).

Flrs. 10-11.

P. Pantlingii *Prain.*

A small herb. *Leaves* broadly ovate, sub-cordate, shallowly pinnately lobed; lobes rotundate, dentate; petiole 2.4 in. long. *Flowers* purplish pink, racemose. *Calyx* campanulate, hirsute. *Corolla* lip 3-lobed, ciliate. *Filaments* slightly puberulous. *Ovary* lanceolate; stigma exserted. *Capsule* .8 in. long, broad, lanceolate, acute. *Seeds* broadly ovate; testa blackish, minutely reticulate.

Delai Valley (Kingdon Ward 8398). 11-12,000 ft.

Flrs. 7.

P. Gammieana *Prain.*

A very small herb. *Leaves* small, much incised, often fascicled. *Flowers* purple, racemose. *Calyx* .3 in. long, 5-toothed, campanulate, hirsute. *Corolla* tip 3-lobed; tube .66 in. long. *Stamens* inserted about the middle of the tube; filaments barbellate. *Ovary* ovoid-lanceolate; stigma exserted.

Delai Valley (Kingdon Ward 8397). 12,000 ft.

Flrs. 7.

P. corymbosa *Prain.*

A small herb, rhizomate. *Leaves* 2.2 by .4 in., carnosose or herbaceous, shortly petiolate, ovate or oblong-obtuse, crenate, shallowly pinnately lobed; base attenuate. *Flowers* pale mauve, turning purple, racemose. *Calyx* sub-campanulate, hirsute; segments ovate, crenate. *Corolla* lobes oblong-ovate, ciliate. *Filaments* glabrate. *Ovary* ovate; stigma exserted. *Capsule* .5 in. long, oblique, ovate, acuminate. *Seeds* somewhat blackish, distinctly reticulate.

LUSHAI HILLS (N. E. Parry 340). 5,000 ft.

P. gibbera *Prain.*

A herb, glabrate, rhizomate. *Leaves* small, .4 by .2 in., ovate, pinnatipartite; petiole .5-1.5 in. long. *Flowers* purple. *Racemes* few

flowered; bracts foliaceous. *Calyx* campanulate; segments 5. *Corolla* lobes rotundate. *Stamens* inserted on the middle of the corolla tube; filament barbellate. *Ovary* lanceolate; stigma included. *Capsule* .35 in. long, oblique, lanceolate, acute. *Seeds* ovate; testa somewhat blackish, minutely punctulate.

Délai Valley (F. Kingdon Ward 8637). 11-12,000 ft.

Flrs. 8.

Calceolaria mexicana Benth.

A herb. *Leaves* opposite, incised or sometimes very deeply, even pinnatifid, pubescent, pale green above; whitish beneath. *Flowers* usually solitary, axillary. *Corolla* yellow, bilabiate; lower lip concave; bladder-like. *Stamen* filter or staminoidal.

A naturalised garden plant introduced from Mexico.

KHASI HILLS (Lake Garden). 5,000 ft.

Flrs. 5-7.

OROBANCHACEÆ.

Leafless herbs; roots parasites. *Flowers* few, bisexual; bracts scale-like. *Calyx* spatheaceous or bilabiate of 4 or 5 free or connate segments. *Corolla* usually bilabiate, hypogynous, curved; throat villous. *Stamens* 4, didynamous, adnate to the corolla tube; anthers 1 or 2-celled, 1-cell often imperfect; cells often spurred at the base, dehiscence by apical pores or slits. *Disc* usually obscure or glandular or unilateral. *Ovary* of 2, rarely 3 connate carpels; ovules many or few on confluent parietal placentas. *Capsule* usually 1-celled; valves 2, rarely 3. *Seeds* many, minute; testa pitted or reticulate; albumen fleshy.

ÆGINETIA Linn.

Leafless herbs with simple or branched naked or scaly scapes or stems. *Calyx* spathaceous. *Corolla* lobes all broad, sub-equal, spreading. *Anther* cells unequal. *Capsule* particularly 2-valved.

Scapes long, more or less slender, naked;
corolla purplish; palcenta multifid. 1. *A. indica*.

Scapes short, stout, bracteate; corolla tube
mouth blue; placentas bi-lamellate. 2. *A. pedunculata*.

1. Æginetia indica Roxb.

Parasite herb of purplish colour, growing as root parasite on many plants. *Seeds* yellow, white.

KHASI & JAINTIA HILLS upto 5,000 ft.

Flrs. & Fr. 7-11.

2. Æginetia pedunculata Wall.

A reddish or yellowish leafless herb often parasite on the roots of grasses, with short underground stems. *Capsule* ovoid. *Seeds* brown.

KHASI & JAINTIA HILLS, 5,000 ft.

Flrs. & Fr. 4-10.

Christisonia Hookeri Clarke.

A fleshy herb; stem 3-4 in. high, stout, glabrous. *Scales* truncate, lacerate. *Flowers* sessile; pedicels ebracteolate. *Calyx* pale violet, 1 in. *Corolla* 2-2.5 in. long, inclined; tube white, inflated; throat contracted. *Stamens* glabrous, included. *Ovary* 1-celled, placenta 2 partite.

KHASI HILLS (2-4,000 ft.). (F.B.I. IV. 321).

FAM. 95. LENTIBULARIACEÆ.

Herbs, aquatic or growing in wet places. *Leaves* rosulate or when submerged capillary multifid or obsolete, insectivorous. *Flowers* bisexual, irregular, usually in raceme or spike. *Calyx* inferior, 2-5 fid or partite, persistent in fruit. *Corolla* bilabiate; lower lip spurred. *Stamens* 2, epipetalous, attached to the base of the corolla; filaments curved; anthers transversely confluent, longitudinally dehiscent. *Ovary* 1-celled, globose; stigma 2-lobed; ovules many, usually anatropous on a free central placenta. *Capsule* 2-4 valved. *Seeds* exalbuminous.

Urticularia Wallichiana Wight and *U. bifida* Linn. (Flowers yellow) are recorded from KHASI HILLS.

***Pinguicula alpina* Linn.**

Flowers white with a yellow spot on the throat.

Delai Valley 10,000 to 11,000 feet.

Flrs. 5.

FAM. 96. GESNERACEÆ.

Herbs or undershrubs, sometimes epiphytic, or rock plant. *Leaves* alternate, opposite, whorled or solitary, fleshy or coriaceous, entire or toothed, exstipulate. *Flowers* hermaphrodite, more or less zygomorphic, in axillary or terminal bracteate racemes, rarely cymose or solitary; bracteoles small. *Calyx* segments 5, valvate or open, rarely imbricate. *Corolla* tubular; lobes 5, imbricate in bud. *Stamens* on the tube usually didynamous, sometimes 5, often only 2 perfect; anthers 2-celled or cells confluent. *Disc* annular, cylindric or 0. *Ovary* 1 or imperfectly 2-celled; style linear; stigma small, capitate or 2-lobed; ovules many, anatropous; placentas parietal, 2-fid. *Fruit* capsular or baccate, dehiscent or indehiscent. *Seeds* numerous, minute; albumen 0 or scanty; embryo straight.

Seeds more or less hairy :—

Fruit capsular, dehiscent :—

- | | |
|--|-------------------------|
| Leaves fleshy. Stamens 4, perfect, exserted,
epiphytic undershrubs. | 1. Æschynanthus. |
| Leaves sub-coriaceous. Stamens 2, perfect,
included. | 2. Lysionotus. |
| Leaves membranous. Stamens 4, perfect,
included. | 3. Loxostigma. |

Seeds without hairs :—

Fruit dehiscent :—

Corolla funnel-shaped :—

- | | |
|---------------------------------------|------------------------|
| Stamens 4, perfect. Capsule 2-valved. | 4. Didissandra. |
|---------------------------------------|------------------------|

Stamens 2, perfect :—

- | | |
|--|-------------------------|
| Capsule sub-follicular, 4-valved; stigma
entire, oblique. | 5. Didymocarpus. |
| Capsule 2-valved; stigma bifid. | 6. Chirita, |

Corolla shortly campanulate :—

- | | |
|---|---------------------------|
| Stamens 2. Capsule twisted. | 7. Bœa. |
| Stamens 4. Capsule linear-cylindric. | 8. Bœica. |
| Corolla bilabiate; tube narrowed at mouth.
Stamens 2. Capsule ellipsoid. | 9. Rhynchoglossum. |
| Corolla bilabiate; tube straight. Stamens
4. Capsule globose, circumsciss. | 10. Epithema. |
| Corolla campanulate, obscurely bilabiate.
Fruit splitting irregular. | 11. Rhynchotechum. |

1. ÆSCHYNANTHUS Jack.

Epiphytic undershrubs or rock plant with slender erect or creeping stems, often rooting at the nodes. *Leaves* opposite, fleshy or leathery, usually entire; nerves more or less obscure. *Flowers* 5-merous, often showy in terminal or axillary fascicles, rarely solitary. *Calyx* sub-entire or more or less partite or fid. *Corolla* tubular, curved, dilated above, more or less bilabiate. *Stamens* on the corolla tube didynamous, 4 perfect; anthers usually exserted, connivent in pairs. *Disc* annular or shortly cup-shaped. *Ovary* superior, stipitate; stigma dilated or peltate; ovules many. *Capsule* long, linear, loculicidally 2-valved. *Seeds* numerous, minute, with 1 or more hairs at the end near the hilum and 1 at the apex, exalbuminous; cotyledons very small.

Seeds with 2 hairs near the hilum and one at the apex :—

- | | |
|---|---------------------------|
| Calyx about 7 in. Corolla 1 in. long, red-orange; lobes dark-spotted. Ovary glabrous. | 1. <i>Æ. Hookeri.</i> |
| Calyx about .5 in. Corolla about 2 in., scarlet orange with dark purple longitudinal stripes behind each lobe and triangular blotch; anthers uniform. | 2. <i>Æ. grandiflora.</i> |
| Calyx about .25 in. Corolla not exceeding .75 in. | 3. <i>Æ. maculata.</i> |

Seeds with one hair not dilated at the base and one at the apex :—

- | | |
|---|-------------------------|
| Calyx deeply fid; segments lanceolate, acute or linear; filaments glandular, hairy, glabrous except the flowers. Leaves 2-4 by .6-1.2 in. | 4. <i>Æ. micrantha.</i> |
| Branches hairy. Leaves .4-.8 by .2-.3 in. | 5. <i>Æ. gracilis.</i> |
| Branches thickly pubescent. Leaves 1-1.3 by .4-.5 in. | 6. <i>Æ. Mannii.</i> |

Calyx segments wide, obtuse or large :—

- | | |
|--|---------------------------|
| Calyx segments persistent. Corolla .5 in., yellow-green. | 7. <i>Æ. acuminata.</i> |
| Calyx segments deciduous. Corolla 1-3 in., scarlet. | 8. <i>Æ. bracteata. •</i> |
| Calyx segments deciduous. Corolla 2-.25 in., rosy. | 9. <i>Æ. superba.</i> |

1. *Æschynanthus Hookeri* Clarke.

An epiphyte. *Leaves* 2-4 by .5-.8 in., narrow lanceolate, acuminate, fleshy; midrib stout beneath; base cuneate;

petiole .25 in. long. *Flowers* in terminal umbles. *Calyx* purple red. *Corolla* 1 in., hairy outside; the lobes black spotted. *Filaments* exserted. *Ovary* glabrous; style glandular, hairy. *Capsule* about 8 by .16 in. *Seeds* minute, tubercled; the hairs at the hilum about 1.25 in. long, near the apex about 1 in. long.

KHASI HILLS (4,000 ft.).

Flrs. 8. Fr. 8-1.

2. *Æschynanthus grandiflora* Spreng. Vern. *Tiw-ri-shen*, Synt.; *Tiw-ri-seinrit*, Kh.

An epiphyte, glabrous. *Leaves* 2.5 by .5-1.5 in., lanceolate, acuminate, undulate, fleshy, glabrous; base cuneate; petiole .3-.6 in. long. *Flowers* about 2 in. long, in terminal clusters. *Calyx* greenish-white, foliaceous, veined glabrous, about .5 in. long; segments lanceolate, acute. *Corolla* inflated upwards, outside puberulous, orange-scarlet with dark purplish longitudinal stripes outside and triangular blotch on the inner face. *Filaments* very much exserted, hairy. *Capsule* upto 15 in. long.

N. C. HILLS, KHASI HILLS.

Flrs. 9. Fr. Cold season.

3. *Æschynanthus maculata* Lindl.

Epiphytic. *Leaves* 1.5-4 by .5-1 in., lanceolate, acuminate, fleshy, glabrous; base acute or cuneate; petiole .1-.3 in. long. *Flowers* 1.2 in. long, clustered, often capitate. *Calyx* puberulous, very deeply divided; segments rather linear, acute, .2 in. long. *Corolla* narrow. *Anthers* rather shortly exserted, each pair confluent connate about the back. *Style* short or exserted. *Capsule* 9-10 in. long.

MANIPUR, KHASI HILLS (6,000 ft.).

Flrs. 6-7. Fr. 11.

4. *Æschynanthus micrantha* Clarke. Vern. *Tewkynjiri*, Kh.

Epiphyte, glabrous, drying purplish stain. *Leaves* 2-4 by $\cdot 5$ - $1\cdot 5$ in., elliptic-lanceolate, acuminate, fleshy, glabrous; base acute or rounded; petiole $\cdot 2$ - $\cdot 6$ in. long. *Flowers* about 2 in. long, terminal or lateral in clusters; pedicels $\cdot 4$ - $\cdot 6$ in. long. *Calyx* glabrate; segments linear-lanceolate, $\cdot 5$ in. long. *Corolla* brick red. *Filaments* exserted. *Capsule* 5-6 by $\cdot 12$ in., shallowly channelled. *Seeds* with 1 hair at either end.

N. C. HILLS, KHASI HILLS (2,500 ft.).

Fr. 11-2.

5. *Æschynanthus gracilis* Parish.

An epiphyte; branches hairy, slender, elongate, rooting. *Leaves* $\cdot 4$ - $\cdot 8$ by $\cdot 2$ - $\cdot 3$ in., lanceolate or obovate, acute, sub-coriaceous, pubescent; base acute or rounded; petiole $\cdot 05$ - $\cdot 8$ in. long. *Flowers* scattered. *Calyx* puberulous, $\cdot 25$ in.; segments linear-lanceolate, acute. *Corolla* $\cdot 8$ in., scarlet, villous without. *Filaments* exserted, obscurely glandular hairy. *Capsule* upto 5 in. long.

N. E. F. TRACT. Upper Dehing Reserve, KHASI HILLS, CACHAR (upto 4,000 ft.).

Flrs. 2-3. Fr. 4-5.

6. *Æschynanthus Mannii* Kurz.

An epiphyte; branches pubescent. *Leaves* $\cdot 8$ - $1\cdot 2$ by $\cdot 3$ - $\cdot 5$ in., elliptic, bluntly acute, sub-coriaceous, fairly pubescent; base bluntly acute or rounded; petiole $\cdot 05$ in. long. *Flowers* axillary, solitary or in pairs. *Calyx* pubescent, $\cdot 2$ in. long; segments acute. *Corolla* $\cdot 7$ in. long, pubescent outside; tube $\cdot 4$ in. long, widening upwards, funnel-shaped; lobes broadly obtuse. *Filaments* exserted, sparingly hairy.

GARO HILLS.

Flrs. 4.

7. *Æschynanthus acuminata* Wall.

Leaves 2-4 by .8-1.5 in., elliptic-acuminate, coriaceous, glabrous; lateral nerves conspicuous about 6 on either half; base narrowed into the petiole, which is .1-.3 in. long. *Flowers* in small clusters, sub-fasciculate, few flowered. *Calyx* broad, deeply divided; segments .2 in., persistent. *Corolla* .5 in., wide, tubular, straight, upper lip green. *Stamens* much exserted, glandular hairy. *Capsule* 6-8 by .1 in.

LAKHIMPUR, GOALPARA, DARRANG, NAGA HILLS, KHASI HILLS.

Flrs. 10-12. Fr. 1-3.

8. *Æschynanthus bracteata* Wall. Vern. *Tiw-la-padong*, Kh.

An epiphyte, glabrous. *Leaves* 2.5-4.5 by 1-1.8 in., elliptic, oblong-elliptic, acuminate, coriaceous, glabrous, paler beneath; lateral nerves about 7 on either half, oblique, unequal, more or less conspicuous beneath; base cuneate or rounded; petiole .3-.7 in. long. *Flowers* usually in terminal clusters; peduncles .75 in. long; bracteoles red, about 8 in. long, broad, ovate, acute, not persistent. *Calyx* scarlet, divided nearly to the base; segments .6 in. long. *Corolla* tubular, widening upwards, 1.5 in. long, scarlet. *Filaments* exserted, glandular hairy. *Capsule* 4-6.

MANIPUR, KHASI HILLS 6,000 ft.

Flrs. & Fr. 8-11.

9. *Æschynanthus superba* Clarke. Vern.. *Thylli-masi*, Kh.

Epiphytic on trees or rock plants, often scandent; branches stout, woody, thickened at the joints. *Leaves* 4-8 by 1.5-2.5 in., elliptic-lanceolate, elliptic-oblong, acuminate, undulate, fleshy, glabrous; midrib very stout and prominent beneath; base cuneate or rounded; petiole .2-.5 in. long. *Flowers* reddish, umbellate, terminal or no spurs of old wood;

peduncles .8 in. long; pedicels .5 in. long; bracts 1.8 by .8 in., veined, reddish, deciduous. *Calyx* reddish; segments thin, oblong-obtuse, 1 in. long. *Corolla* 2.5 in. long; tube with longitudinal ribs of darker red, and lobes with patchy darker stripes. *Filaments* exserted, minutely glandular hairy. *Capsule* upto 18 by .12 in.

KHASI HILLS, 4,000 ft.

Flrs. 8-10. Fr. 11-1.

Æ. sikkimensis Stapf. Tab. 8938, Curtis B. Magazine, 1922, Vol. CXLVIII.

An epiphytic undershrub; branches pendulous, glabrous. *Leaves* 2.4-6 by .8-1.6 in., oblong-lanceolate, caudate or acuminate, entire or very obscurely toothed, fleshy, leathery, pale green, glabrous; lateral nerves about 5 on either side, inconspicuous, oblique; midrib stout. *Cymes* axillary and terminal, much contracted upto with 6 rarely more flowers; bracts linear to awl-shaped, .16 in. long; pedicels slender. *Calyx* 5-toothed; tube narrowly cylindric or wider upwards .11 in. long; teeth as long as the tube or slightly shorter, very narrow linear-lanceolate or almost awl-shaped. *Corolla* curved, funnel-shaped, narrowed at the base, about 1-1.2 in. long, .24-.28 in., wide at the mouth, with short almost equal rounded lobes .07 in. long, scarlet with short glandular hairs, outside more yellow and glabrous; lobes marked with black decurrent streaks. *Stamens* shortly exserted; filaments with short glandular hairs; anthers purplish. *Ovary* linear, immersed at the base in cup-shaped disk, much shorter than the corolla, ultimately exserted from it, the upper part with glandular hairs. *Capsule* linear, narrowed at both ends, stalked, curved, upto 6 in. long. *Seed* oblong, almost .04 in. long; testa wrinkled with 2 hairs at the base and 1 at other ends, hairs .8-1 in. long, and 1.2-1.6 in. long, respectively.

KHASI HILLS, (Hooker & Thompson 9-1800 m.).

Æ. deleinsis C. E. C. Fischer.

A slender epiphyte; branchlets pale brown, glabrous. *Leaves* 2.5 by 1.2 in., broadly lanceolate, bluntly acuminate, coriaceous, glabrous; base acute; petiole .4 in. long. *Flowers* scarlet with a short stripe down each lobe, solitary, axillary; pedicels slender, subtended by 3-4 linear, ensiform bracts. *Calyx* .4 in. long; tube narrowly campanulate; lobes linear-ensiform. *Corolla* tubular, ventricose, 2.1 in. long; mouth oblique; lobes sub-equal, broadly rounded. *Stamens* exserted; filaments flat, glabrous below, hairy above; anthers cohering in pairs at the apex, disc annular. *Capsule* 7.2 in. long, linear, glab-

rous; valves everted and complicate after dehiscence. *Seeds* oblong, granulate.

Delai Valley (Kingdon Ward, 8447) 5,000 ft. (Kew Bulletin 1935, p. 320).

Flrs. 5.

Æ. lenearifolia C. E. C. Fischer. (Kew Bulletin 1935, p. 321).

An epiphyte, glabrous. *Leaves* 4·1 by ·4 in., linear, oblanceolate, bluntly acuminate; midrib impressed above, prominent beneath; base obtuse; petiole ·3 in. long, channelled above, rugulose. *Flowers* terminal or axillary; peduncles solitary or fascicled. *Calyx* scarlet (F. K. Ward); segments ·8 in., sub-equal, ligulate or linear-lanceolate, obtuse or sub-acute. *Corolla* "upper half almost scarlet; lower half bright yellow," tubular; lobes sub-equal, broadly oblong, rounded. *Stamens* inserted about the middle of the corolla tube; filaments beset with gland-tipped hairs towards the apex; anthers sub-cordate, cohering in pairs by the apex. *Fruit* 3·5 in. long, linear, curved.

Delai Valley (F. K. Ward, 8470). (Kew Bulletin 1935, p. 321).

Flrs. 7.

2. LYSIONOTUS D. Don.

Epiphytic shrubs, glabrous. *Leaves* opposite or whorled. *Flowers* on many flowered peduncled cymes. *Calyx* segments lanceolate. *Corolla* tubular, dilated at the middle, bilabiate. *Stamens* 2, perfect; anthers connivent, connective appendaged. *Disc* annular. *Ovary* superior, stipitate; stigma shortly bilobed. *Capsule* linear, dehiscing loculicidally into 2-valves. *Seeds* small with a hair at the apex.

Leaves closely serrate or sinuate, herbaceous;
nerves prominent, oblique. 1 *L. serrata*.

Leaves entire or minutely crenate towards the
apex; nerves obscure, at right angles to the
midrib, coriaceous. 2 *L. conferta*.

1. *Lysionotus serrata* D. Don.

An erect or sub-erect shrub, epiphytic on trees or rock plant, upto 28 in. in height; stem glabrous. *Leaves* 2·5 by ·5·1·3 in., elliptic to narrow-lanceolate, often ternate, closely serrate or sinuate, acuminate, herbaceous; lateral

nerves conspicuous, oblique; base often oblique, cuneate; petiole .5 in. long. *Peduncle* .3-.7 in. long; bracts .3 in., ovate. *Calyx* segments .25 in. long, often enlarged in fruit upto .5 in. *Corolla* 1.4 in., purple with darker veins. *Capsule* 3-4 in. long, with a filiform funicle and an apical hair.

MANIPUR, KHASI HILLS, (4,000 ft.).

Flrs. 7-8. Fr. Cold season.

2. *Lysionotus conferta* Clarke.

Leaves elliptic-acuminate, sub-entire or obscurely crenate at the apex, coriaceous; lateral nerves obscure at right angles to the midrib; peduncles and capsules nearly allied to *L. serrata*. *Flowers* not seen.

Imperfectly known.

S. E. ASSAM, PATKAI HILLS. (Kew No. 3819). (*F. B. I.* 344 IV).

3. *LOXOSTIGMA* Clarke.

Loxostigma Griffithii Clarke.

A shrub 10-15 ft. high and 9 in. girth, but generally an undershrub 3-4 ft. high. *Leaves* opposite, 2.4-5 by .5-1.5 in., elliptic or sub-falcate, finely serrate, acuminate-membranous, puberulous above, thinly pubescent, paler beneath; lateral nerves 8-10 on either half, slender but conspicuous below; base cuneate or acute, often unequal; petiole upto 1.2 in. long, pubescent. *Flowers* in lax peduncled cymes; peduncles slender, long; pedicels filiform, .5-1 in. long. *Calyx* divided to the base; segments 5, lanceolate, .15 in. *Corolla* 1.7 in. long, ventricose, bilabiate, pale yellow, pubescent outside, glabrous and with brownish purple dots and blotches inside. *Stamens* 4, didynamous, included; anthers 2-celled, connivent in pairs. *Ovary* shortly stipitate. *Capsule* loculicidal for the whole length, about 1 in. long, crowned with the persistent style; placenta

revolute, covering the seeds. *Seeds* pendulous; funicle capillary with a single hair at the apex.

KHASI & JAINTIA HILLS, (2,000 ft.).

Fr. 12.

4. DIDISSANDRA Clarke.

Didissandra lanuginosa Clarke.

A scapose perennial; stem hardly any. *Leaves* 1·5-2·75 by 1-1·5 in., crowded, ovate, sub-orbicular or elliptic, crenate, obtuse, sparingly hirsute above, mottled hairy beneath; base attenuated; petiole about 1 in. *Scape* thinly hairy upto 3-6 in. long. *Flowers* light purplish, ·4 in. long. *Stamens* 4, fertile; anthers peltate, cohering in pairs. *Ovary* glabrous. *Capsule* linear, ·7-·9 in. long, somewhat grooved, beaked, often curved.

KHASI HILLS, 4,000 ft.

Flrs. 8.

5. DIDYMOCARPUS Wall.

Herbs or undershrubs. *Leaves* opposite or alternate or ternate, simple, exstipulate. *Flowers* in axillary pedunculate cymes. *Calyx* 5-fid or partite. *Corolla* infundibuliform; lobes 5, rounded, mouth oblique or sub-symmetric, often bilabiate. *Stamens* 2, perfect, 2-3-staminodes; filament filiform; anthers cohering in pairs; cells ovate. *Ovary* stipitate or sessile, narrow; stigma oblique, peltate or unilateral, rarely 2-lobed. *Capsule* linear, loculicidal. 2-valved or sub-follicular, ultimately often 4-valved, bearing the placenta on the valves. *Seeds* ellipsoid, minutely reticulate.

A genus of no forest importance.

D. punduana Wall. Stem 8-10 in., pubescent. *Leaves* 2-8 by 1-4 in., oblong, coriaceous, pubescent above, glabrate beneath; petiole upto ·2 in. long. *Inflorescence* large, about 7 in. across. *Corolla* 1 in. long. *Capsule* upto 1·7 in. long.

KHASI HILLS, 5,000 ft.

Flrs. 7-9. Fr. 10.

D. Hookeri Clarke. Stem upto 16 in., villous. *Leaves* 2·6 by ·8-3·5 in., ovate or sub-orbicular, pubescent above, puberulous beneath, specially along the nerves; petiole upto 4 in. *Inflorescence* smaller, about 3 in. across. *Corolla* ·6 in. long, pubescent. *Capsule* upto 1·2 in. long.

KHASI HILLS 6,000 ft.

Flrs. 8-9. Fr. 10.

D. acuminata Br. Stem upto 6 in., hairy. *Leaves* ovate, larger than the above species (upto 10 by 6 in.), glabrous beneath.

KHASI HILLS.

D. adenocarp Fischer. A low herb. *Leaves* 3·6-6 by 2·3-2 in., all caulescent, membranous, often unequal, oblong-acute or abruptly acute, cuspidate; base shallow-cordate.

LUSHAI HILLS.

6. CHIRITA Ham.

Chirita acuminata Br.

An herb, rather shrubby; stem simple. *Leaves* opposite, 4-10 by 1·5-6 in., ovate or elliptic, acuminate, closely serrulate or sub-entire, hairy on both surfaces, green paler beneath; lateral nerves 9-12 on either half, sub-parallel, oblique; petiole ·5-3 in. long. *Flowers* in axillary many flowered cymes. *Calyx* 5-fid. *Corolla* ·2 in., funnel-shaped, 5-lobed, bilabiate. *Stamens* 2, purple. *Staminodes* 2-3; anthers usually applied to the stigma; cells divaricate. *Ovary* linear; stigma peltate, oblique, notched on lower margins, bifid with age. *Capsule* 2-3 by ·13 in. *Seeds* ellipsoid, minutely imbricate, obscurely ribbed and minutely reticulate.

KHASI HILLS (4,000 ft.).

Flrs. 8. Fr. 11-4.

C. mishmiensis Debbarman ex Biswas.

A low herb. *Roots* fibrous. *Root-stock* very small with leaves developing more or less from the base. *Leaves* rather aggregate, elliptic-oblong, 4-8 in. long, 1·2-1·5 in. broad, margins crenate-serrate, chartaceous, acute at the apices, cuneate at the base, but not oblique, sericeo-tomentose on the upper green surface, densely adpressed woolly beneath; hairs on the lower surface, especially along the midrib fulvous or pale brown; midrib and 8-10 lateral nerves on either side of the lamina obscure; petiole ·8-1·5 in. long; peduncles slender, uniflorate, ·8-1·2 in. long. *Calyx* ·6 in. in diameter, puberulous inside, 5-partite; segments ·25-·33 in. long, sub-equal, subulate. *Corolla* 2-2·5 in. long, ·4-·6 in. in diameter, yellow, minutely puberulous outside, sub-glabrous inside, 5-lobed; lobes about 2 in. long, and as much broad, sub-equal, round, purplish. *Stamens* 5, perfect, 2

connivent, sometimes abortive; filaments geniculate, glabrous below. barbate at the apices; anthers ovate, 2-celled. *Ovary* linear, softly hairy; styles long, linear, tubulate, pubescent; stigma membranous, infundibuliform, unilateral, emarginate, smooth; ovules many, minute. *Capsule* not seen.

This new species could not be matched at Kew or at the Calcutta Herbarium. It is quite distinct in its characters but the two species which are to a certain extent allied to this new species are *C. brevipes* Clarke and *C. primulacea* Clarke. The former differs from *C. mishmiensis*, in its having leaves with petiole longer, lamina broadly elliptic and much more villous at the base, hairs deeply fulvous; peduncles longer and solitary; flowers comparatively much longer; calyx-lobes divided half way or sometimes nearly to the base. The latter in having single longer tap root, leaves with longer petiole, leaf-bases more cuneate, frequently oblique, margins compoundly crenate-serrate, hairs grey; inflorescence elongate, cymose; peduncles rather short but slender; calyx-lobes shorter, rarely divided half way down.

***C. urticæfolia* C. B. Clarke.**

A herb rather shrubby, 1-2 ft. high. *Leaves* 4.5-5 by 1.5-3 in., broadly elliptic or obovate-elliptic, rather membranous; crenate serrate, acute, cuneate at the base, slightly oblique, hairy on the upper surface; lateral nerves, 7-10 on either half; petiole upto 2 in. long. *Peduncles* uniflorate, 1.5 in. long. *Calyx* .4 in., puberulous; segments sub-equal. *Corolla* minutely puberulous outside towards lower half about 2 in. long, zygomorphic.

KHASI HILLS, Dumpep (10844).

Flrs. 9.

***C. pumila* Don & *C. macrophylla* Wall.** also occur in KHASI HILLS.

7. BŒICA Clarke.

Undershrubs. *Leaves* alternate. *Flowers* small in axillary, lax-fid racemose or paniced cymes; bracts small. *Calyx* 5-fid or partite. *Corolla* tube short, obscurely bi-lobed, lobes subequal, rounded. *Stamens* 4; filaments short; anthers commonly 2-celled. *Ovary* sessile. *Capsule* 4-valved, linear, beaked by the style. *Seeds* small, smooth, ellipsoid.

A genus of no Forest importance.

***Bœica filiformis* Clarke.**

Innovations nearly glabrous. *Leaves* 4-6 by 1-1.7 in., oblanceolate or obovate, elliptic-acuminate; lateral nerves about 9 on either half; base cuneate; petiole .3-.9 in. long. *Peduncles* slender, 3 in. long or

more; pedicels and branches of inflorescence filiform, glabrous. *Capsule* .5 in. long, glabrous.

LAKHIMPUR, CACHAR, KHASI HILLS & GARO HILLS.

Flrs. 2. Fr. 3-4.

B. Griffithii *Clarke*. Similar to *B. filiformis*. Innovations silky.

B. fulva *Clarke*. Similar to *B. filiformis*. Innovations woolly. (*F.B.I.*, 363, Vol. IV).

B. hirsuta *Clarke*. Leaves 7 by 2.5 in. *Capsule* .25 in., minutely hairy, 4-valved. (*F.B.I.*, 363 Vol. IV).

8. BŒA Commers.

Bœa multiflora *Br.*

A scapose perennial, woody; extremities pale brown, tomentose. *Leaves* crowded, 3-6 by 1-2 in., elliptic, crenate, acute, sub-coriaceous, glabrate above, tomentose beneath, specially on the nerves; lateral nerves 9-11 on neither half; tertiaries reticulate beneath; base cuneate; petiole .3-.1 in. long. *Inflorescence* cymose; peduncles tomentose, many, 5-8 in. long. *Calyx* 5-fid. *Corolla* campanulate, distantly bilabiate. *Stamens* 2, perfect. *Ovary* sessile; stigma capitate. *Capsule* linear, about .5 in.

KHASI HILLS (4,000 ft.)

Flrs. 7. Fr. 8-9.

9. RHYNCHOGLOSSUM Blume.

Rhynchoglossum obliquum *Blume*.

A tall succulent herb. *Leaves* 2-5 by 1-2.1 in., ovate-acuminate, membranous, almost glabrous; lateral nerves conspicuous, numerous, oblique. *Flowers* 5-merous in lax terminal racemes upto 10 in. long; bracteoles filiform. *Calyx* campanulate, cleft, enlarged in fruit. *Corolla* tube cylindric; limb bilabiate; upper lip short, 2-lobed; lower lip very much longer than the upper lip, sub-bilobed. *Stamens* 2, perfect; anthers connivent. *Ovary* ovoid; stigma dilated. *Capsule* included in the enlarged calyx, ellipsoid, membranous, loculicidally 2-valved. *Seeds* smooth.

KHASI HILLS (4,500 ft.).

Flrs. & Fr. 9-10.

10. EPITHEMA Blume.

Epithema carnosum Benth.

Small rock herb; pubescent. *Leaves* crenate, sinuate, pubescent. *Flowers* in long peduncled axillary scorpioid cymes; pedicels short. *Calyx* campanulate, .13-.17 in., hairy; segments 5, acute. *Corolla* .25-.35 in., tube short; lobes 5, bilabiate. *Stamens* 2, perfect, 2-staminoidal, shorter; anthers coherent. *Ovary* ovoid, pubescent at the apex; stigma subcapitate. *Capsule* globose, .09 in. in diameter. *Seeds* narrowly oblong.

KHASI & JAINTIA HILLS (2-3,000 ft.).

Flrs. 8.

11. RHYNCHOTECHUM Blume.

Shrubs or undershrubs; young parts tawny. *Leaves* opposite or alternate. *Flowers* numerous in axillary, trichotomous or umbellately compound cymes; bracts inconspicuous. *Calyx* 5-cleft; segments narrow. *Corolla* small, campanulate, bilabiate; lobes 5, subequal. *Stamens* 4, perfect, adnate to the base of the corolla; anther-cells 2, subparallel. *Ovary* sessile, ovoid. *Disc* small, annular or absent. *Berry* small, globose, apiculate, pulpy. *Seeds* smooth, very small.

Rhynchotechum ellipticum A. DC. Vern. *Jowpang-asing*, Miri; *Ja-kharia*, Kh.; *Dieng-ia-mahek*, Synt.

An erect undershrub 3-5 ft. high with thickened stem; young parts tomentose. *Leaves* opposite 5-13 by 1.5-5 in., broad-elliptic, abruptly acute, dentate, coriaceous, glabrate above, tomentose beneath, specially on the nerves; lateral nerves 14-20 on either half, almost parallel; base cuneate; petiole .2-1.5 in. long. *Flowers* .12-.16 in. across. *Inflorescence* usually from old wood. *Calyx* segments linear, scabrous, .2 in. long, persistent. *Berry* .2-.25 in. in diameter, whitish, juicy. *Seeds* very minute.

CACHAR, N. E. F. TRACT, KHASI HILLS.

Leaves are used as vegetable.

Flrs. 10. Fr. 2-3.

R. vestitum Hk. f. & T.

Stem 3-4 ft., extremities very hispid. *Leaves* 4-8 by 1.5-4 in., oblong; elliptic or obovate-elliptic, acuminate, sub-coriaceous, hirsute;

lateral nerves 9-13; base cuneate or narrowed into the petiole .5-2 in. long. *Flowers* in axillary trichotomous corymbose and hirsute cymes. *Fruit* like pale glass beads supported by the hirsute calyx.

KHASI HILLS.

Flrs. 9-10. Fr. 11-12.

R. latifolium Hk. f. & T. *R. alternifolium* Clarke and *R. calycinum* Clarke are also recorded from the region of the Flora. (F.B.I., p. 374. Vol. IV).

FAM. 97. *BIGNONIACEÆ*.

Trees and shrubs, often climbing. *Leaves* opposite, usually compound, exstipulate. *Flowers* bisexual, zygomorphic, often large and showy in racemes or panicles, usually terminal (sometimes solitary or clustered on the old wood). *Calyx* spathaceous or campanulate; segments 2-5, valvate. *Corolla* bilabiate, tubular-ventricose; lobes 5, subequal, usually imbricate. *Stamens* 4, didynamous (5th often present as a staminode, rarely perfect); anthers 2-celled, the cells parallel or divaricate. *Disc* usually conspicuous. *Ovary* 2-celled (*Crescentia* 1-celled); style long; stigmas 1 or 2-lobed; ovules numerous, erect, anatropous in axile placenta. *Fruit* a septicidal or loculicidal capsule. *Seeds* flattened or trigonous and with a large membranous wing, exalbuminous; cotyledon flat or folded.

Ovary 2-locular :—

Perfect stamens 5 :—

Capsule septifragally dehiscent, very large,
flat. Leaves 2-3-pinnate; tree. ..

1. *Oroxylum*.

Perfect stamens 4 :—

Capsule septifragally dehiscent, exotic
climber with 2- or 3- foliolate leaves;
flowers showy. ..

2. *Bignonia*.

Capsule septicidally 2-valved; large
climber; leaves opposite, 3-foliolate. ..

3. *Nyctocalos*.

Capsule loculicidally 2-valved; calyx irregularly 3-5-lobed. Leaves large, 1-pinnate, tree.

4. **Haplophragma.**
(**Heterophragma.**)

Capsule elongate, terete, cylindric loculicidally 2-valved; calyx sharply lobed or truncate. Leaves large, 1-2 pinnate, tree.

5. **Stereospermum.**

Capsule winged on both margins, oblong, loculicidally 2-valved; calyx large, ovoid, compressed. Leaves large, 1-pinnate.

6. **Pahanelia.**

Ovary 1-locular :—

Perfect stamens 4 :—

Leaves alternate, simple. Flowers on old stem. Berries gourd-like; seeds not winged.

7. **Crescentia.**

1. OROXYLUM Vent.

Oroxylum idicum Vent Vern. *Toguna*, *Bhatghila*, *Dingari*, Ass.; *Thikalong*, Kach.; *Tatola*, Nep.; *Napakban-arong*, Mik.; *Ja-rang-hon*, *Dieng-tit-kong-ling*. Kh.; *Kanai-dinga*, Cach.; *Samba*, Manip.; *Polchang-kok*, Lushai; *Chaboi*, Tipp.; *Kharong-khandai*, Mech.; *Khiring*, Garo; *Naora*, Jharua; *Dieng-kawait-blai*, Synt.

A small tree with few branches and open crown; bark soft, light, brownish grey, corky outside. Leaves opposite, ternately bipinnate, 4-6 ft. long. Leaflets 3-4 by 1-3 in., broad-ovate, entire, acuminate, glabrous; petiolule .1-1.5 in. long. Flowers large, fleshy, purplish, in long terminal lax racemes; peduncle stout, 2-5 ft. long; pedicels 1-1.5 in. long. Calyx 1 by .6 in., scarcely toothed, fleshy or coriaceous. Corolla campanulate; tubes green outside, 2-3 in. long and across; lobes dark red, imbricate. Stamens 5, all fertile; anther cells subparallel. Disc prominent. Ovary compressed; ovules numerous, many seriate in each cell. Capsule shortly stipitate, 1-3 by 2.5-3.5 in., scabbard-like. Seeds surrounded by a broad hyaline wing 2-3 in. across.

Common throughout the province.

Bark and fruit are used in tanning and dyeing. Root, bark, leaves and seeds are used in Hindu medicine. Wood yellowish-white, weight 30 lbs. per c. ft. scarcely used, broad, fine.

Flrs. 6-8. Fr. Cold season.

2. BIGNONIA (Tourn.) L.

Bignonia magnifica Bull in Gard. Chronicle.

A handsome scandent shrub. *Leaves* compound, often 2-foliolate, the terminal leaflet is reduced to a spinescent growth or arrested tendril. *Leaflets* 1·5-4 by ·7-2·3 in., obovate-elliptic or broadly obovate, entire, obtuse, glabrous, 3-nerved at the base; petiole ·05-·2 in. long. *Flowers* large, zygomorphic, delicate, mauve to crimson in large stout pedunculate racemes; pedicels ·8 in. *Calyx* tubular, almost truncate, ·4 in. long. *Corolla* almost bilabiate, 5-lobed. *Stamens* 4, didynamous. *Fruit* not seen.

Dipling-SIBSAGAR (No. 3507 Kanjilal). Native of Columbia U. S.
Flrs. 2.

3. NYCTOCALOS Teijsm & Binn.

Nyctocalos Thomsoni Hook. f. Bot. Mag. t. 5678.

A large glabrous climber. *Leaves* opposite, 3-foliolate; petiole 4 in.; leaflets 6 by 3 in., broadly elliptic, caudate-acuminate; petiolule ·5-2 in. long. *Peduncles* terminal, few flowered. *Calyx* teeth 5, linear. *Corolla* large, white with long tube (7 in.); lobes 5, round. *Stamens* attached near the top of the corolla tube. *Anthers* yellow; connective minutely mucronate; stigma sub-capitate, tongue-shaped. *Capsule* oblong, 6 by 2 in. septicidally 2-valved; valves almost woody. *Seeds* thinly discoid, surrounded by a hyaline wing.

Gauhati (Jenkins), Mikir Hills. (F.B.I., IV. 377).

4. HAPLOPHRAGMA P. Dop.

Haplophragma adenophyllum P. Dop. = *Heterophragma adenophyllum* Seem. Vern. *Dhopa-paruli*, Ass.; *Ziron*, Lushai; *Mostan-phul*, Cach.; *Lotum-poh*, Mik.

A fairly large tree. *Bark* grey, deeply furrowed in large trees, ·5 in. thick; blaze white, turning brown, fibrous, extremities mostly tomentose. *Leaves* 2-3 ft. long; leaflets 1-2 ft. long, variable, 4-11 by 2·5-5 in., elliptic, entire, acute, glabrous above, rusty pubescent beneath; lateral nerves prominent beneath, about 7 on either half, alternating with

the midrib; petiolule 0·3 in. long. *Flowers* large, yellowish brown, in dense terminal tomentose panicles; bracts deciduous, ·5 in., lanceolate. *Calyx* upto 1 in., rusty-tomentose, campanulate, irregularly toothed. *Corolla* densely rusty-tomentose outside, mouth 2 in. across; lobes 5, sub-equal. *Stamens* 4, didynamous; anther-cells linear-oblong, divergent. *Disc* cushion-shaped. *Ovary* sessile, many seriate; stigma 2-lobed, cylindric, ribbed, twisted; ovules numerous. *Capsule* elongate, upto 3 ft. long, loculicidally 2-valved, twisted. *Seeds* 1 by ·5 in., compressed with a membranous wing on each side.

SIBSAGAR, LUSHAI HILLS, SYLHET, KAMRUP, NOWGONG, N. C. HILLS.

Wood yellowish, hard, well deserving of being better known, 42 lbs. per c. ft. Does not warp or split and should be very suitable for furniture and cabinet work. Bows are made of the timber.

Flrs. 3. Fr. Cold weather.

5. STEREOSPERMUM Cham.

Trees. *Leaves* opposite, imparipinnate. *Flowers* large, terminal, in ample lax panicles with decussate branching. *Calyx* campanulate, truncate or shortly and unequally lobed. *Corolla* curved, tubular-campanulate, bilabiate; lobes 5, sub-equal, imbricate, often crisped toothed or laciniate. *Stamens* 4, didynamous, included (with a rudimentary scar); anther-cells divaricate or divergent. *Disc* fleshy, more or less cupular. *Ovary* sessile, elongated, 2-celled; ovules numerous, biseriate in each cell; style slender; stigma 2. *Capsule* 4 angled or terete, loculicidally 2-valved; septum thick, corky, cylindrical, pitted in alternating cavities to receive the seeds, the somewhat membranous wings of which lie flat along it. *Seeds* compressed or sub-trigonus; cotyledons folded, radicle straight.

Leaves imparipinnate :—

Leaflets 7-11, elliptic, cordate-acuminate.

Calyx shortly toothed. Capsules 12 in. or more.

1. *S. chelonoides*.

Leaflets 3-7, acute or acuminate. Calyx

sub-truncate. Capsules 10 in. or less

2. *S. glandulosum*.

Leaves 2-pinnate. Calyx shortly bilabiate or sub-spathaceous. Corolla lobes crenulate. Capsules rusty coloured, 15 in. or more.

3. *S. hypostictum*.

1. *Stereospermum chelonoides* DC. Vern. *Mouser-phang*, Kach.; *Ser-phang*, Mech.; *Bolsel*, Garo; *Paroli*, Ass.; *Ing-nge-ching*, Naga; *Dieng-phsiar*, Synt.; *Jinghal*, Lushai; *Awal*, Cach.; *Paraia-awal*, Paroi, Sylh.; *Miji*, Tipp.; *Inghet-arong*, Mik.; *Dieng-sir*, Kh.; *Parhori*, Nep.

A large deciduous tree; branches spreading. *Bark* yellowish grey, rough outside, longitudinally furrowed on old trees, 1 in. thick, exfoliating in thin concentric plates; outer plates comprising about .75 in. deep, brown, hard; inner plates white and soft. *Leaves* imparipinnate, 12-18 in. long; leaflets 7-11, 2-7 by 1-3 in., often unequal sided, elliptic, elliptic-oblong, caudate-acuminate, entire or occasionally serrulate, coriaceous, glabrous; lateral nerves 8-10 on either half, distinct; midrib impressed above; petiolules .2-.6 in. long. *Flowers* fragrant in lax terminal glabrous panicles; branching slender and articulate. *Calyx* purplish, campanulate, .25 in. long, irregularly toothed. *Corolla* about 1 in. long, villous inside; the tube yellowish with purplish tinge and veined; lobes rounded, crisped. *Filaments* bearded at the base. *Capsule* 15-20 in., curved, compressed, obscurely 4-angular, more or less spirally twisted. *Seeds* 1 by .2 in., with wings straight along the back also.

Throughout ASSAM ascending upto 4,000 ft.

The wood is fairly durable and is very good as an impregnate sleeper. Very hard for hand sawing, used for dugouts and small building works; weight 40 lbs. per c. ft.

The leaves, roots and flowers have some repute in Hindu medicine.

Flrs. 4-6. Fr. Cold season.

2. *Stereospermum glandulosum* Miq.

A small tree; branches spreading. *Bark* whitish and corky outside, pale green beneath the thickish layer of cork with a few round warts; inside finely fibrous; concentric layers pale brown, turning dirty brown; branchlets lenticellate. *Leaves* imparipinnate, 15-20 in. long. *Leaflets* 3-7, 3.5-8 by 1-3.5 in., unequal sided, elliptic or lanceolate, elliptic-oblong, entire, acute or sharply acuminate, chartaceous, glabrous (with a tuft of white hairs at the base of the blade);

lateral nerves 7-11 on either half, distinct, slender; petiolule .1-.6 in. long. *Flowers* white, tinged with pink, in few flowered terminal or sometimes axillary panicles; bracteoles caducous. *Calyx* red, persistent, .2 in. long. *Corolla* 1.5 in., glabrous, cylindric below, campanulate above, pubescent within. *Staminode* clavate. *Disc* glabrous. *Capsule* slender; terete, smooth; valves thin, 8-10 in. long, papery. *Seeds* flat, ovate, .12 in. broad including the wings, which are very membranous and silky.

N. CACHAR HILLS, LUSHAI HILLS.

Flrs. 2-3. Fr. 5.

3. *Stereospermum hypostictum* Miq. Vern. *Ka-wait-blai*, Synt.

A large tree. *Bark* greenish grey with vertical brown lenticels, .5-.6 in. thick in very thin concentric layers, pale grey inside, turning to darker grey with distant bands of cellular tissue of dull white colour. *Branchlets* with prominent oblong lenticels and covered with minute grey scales. *Leaves* 2-3 pinnate, 2-3 ft. long; rachis channelled above; primary pinnae 4-6 pairs, the first 3 pairs with one or 2 pairs of secondary pinnae which are 3-5 foliolate. *Leaflets* 1.5 by .5-1.5 in., elliptic or lanceolate, caudate-acuminate, entire, sub-coriaceous, punctate, shining and deep green above, paler beneath; lateral nerves 6-7 on either half; base rounded or attenuate; petiole .05-.4 in. long, channelled above. *Flowers* white, tinged pinkish, in branched panicles. *Calyx* closed in the bud, bilabiate, and in flowers deciduous. *Corolla* .2 in., cylindric below, campanulate above, glabrous; lobes rounded, crenulate. *Filaments* glandular-hairy below. *Ovary* oblong, flattened; stigma bilobed. *Capsule* 15 in., more or less torulose, valves thin. *Seeds* flat, concave, about .12-.16 in. across; wings about .3 by .12 in., transparent, shining, dissepiment sub-terete with convex faces but with 2 ridges along the sides.

KHASI & JAINTIA HILLS ascending upto 4,000 ft.

Flrs. 5-6. Fr. Cold season.

6. *PAJANELIA* DC.

***Pajanelia Rheedii* DC.** Vern. *Dieng-Tang-leng*, *Dieng-long-oh*, Kh.; *Hona*, *Kawarnoa*, Sylh.; *Totala*, Nep.; *Honur*, Cach.; *Baklong*, Tipp.

Tree not branched. *Bark* greyish brown with vertical lines of large blackish warts, rough outside, .8 in. thick; inside light chocolate brown with coarse irregular white strands. *Leaves* imparipinnate, upto 3 ft. long; rachis terete with a sharp ridge on the vertical side; leaflets 3-9.5 by 1.5-4 in., opposite (21-25), ovate or ovate-elliptic, lanceolate, entire, acute or shortly acuminate, rather coriaceous, glabrous; lateral nerves slender, about 7 on either half; base oblique and unequal; petiolule 0.3 in. long. *Flowers* large, 2-3 in. long, dark purplish, in robust terminal panicles upto 1.5 ft. long; pedicels thick, .6 in. long. *Buds* inflated before opening. *Calyx* 1.1 in. long, tubular, irregularly 5-partite, ultimately deciduous. *Corolla* dull white, 2-3 in.; lobes 5, crisped, rounded, 1 in. long. *Stamens* 4. *Capsule* straight, flat, upto 18 by 3.25 in., glabrous, winged on both margins, which again are split and the capsule becomes 4-winged, septa flat. *Seeds* compressed, winged at both ends.

SYLHET, CACHAR, KHASI & JAINTIA HILLS upto 2,000 ft.

Flrs. 12-2. Fr. 3-5.

7. *CRESCENTIA* L.

***Crescentia cujete* Linn.** Vern. *Bilati-Bel*, Tipp. The Calabash Tree.

An exotic (from America) tree. *Leaves* 1-6 by .5-2.5 in., simple, alternate, clustered, nearly sessile. *Flowers* greenish white in clusters on old wood. *Corolla* campanulate with dull purple lines. *Fruit* large, globose, baccate, gourd-like. *Seeds* not winged.

Cultivated, NATURAL or TROPICAL AMERICA. SYLHET (No. 7695 B. C. Sen Gupta).

Calabash is prepared from the woody epicarp after removal of the pulp.

• Flrs. 11.

FAM. 98. PEDALINEACEÆ.

Herbs, rarely shrubs. *Leaves* opposite or the upper alternate; hairs glandular, deeply lobed or divided. *Flowers* zygomorphic, bisexual, solitary or in cymes. *Corolla* tubular-ventricose; lobes imbricate. *Stamens* 4, didynamous. *Ovary* usually 2-celled (rarely 1-celled) or 4-locular with false septa; style long; stigma bilobed; ovules few or many on axile placenta. *Fruit* capsular or drupaceous, sometimes with hook. *Seeds* wingless, albumen 0 or thin; embryo straight.

SESAMUM Linn.

Sesamum orientale Linn.=Sesamum indicum DC.
Vern. *Til*, Beng. The ginger oil plant.

Erect annual, 1-3 ft., glandular. *Flowers* purplish or whitish, pubescent. *Stamens* 4, perfect, didynamous; ovules 2 in each cell. *Fruit* capsular, 1 in. long, oblong, bluntly 4-gonous.

Extensively cultivated, for the seeds (black, white and red).

The oil is emollient, demulcent and laxative, used for cooking, and also as a hair oil. specially scented.

Flrs. 10-12. Fr. 12-1.

FAM. 99. ACANTHACEÆ.

Herbs or shrubs, rarely trees, sometimes climbing, usually with swollen joints. *Leaves* opposite, rarely alternate, simple, entire, exstipulate, sometimes lanceolate with cystolith. *Flowers* zygomorphic in spikes, cymes or racemes, sometimes paniced, rarely solitary with usually large persistent bracts and bracteoles. *Calyx* usually 5(-4) partite, rarely minute or multifid. *Corolla* 2-lipped or subequally 5-lobed, imbricate or twisted in bud. *Stamens* 4, sometimes didynamous or 2 inserted on the corolla tube, 1-3 staminodes frequently present; anthers 2- or 1- celled, the cells sometimes remote; pollen shows great variety of pollens and sculpture (Haines). *Disk* often conspicuous and nectariferous. *Ovary* superior, 2-celled with axile placenta; style long; stigma bifid; ovules 1-many in each cell. *Capsule* loculicidal, the valves often elastically recurved. *Seeds* ovoid or compressed, usually hard, attached (with the exception of a few genera) to up-curved elastic supports (retinacula) with pointed tips and usually exalbuminous.

Seeds not supported on retinacula :—

Calyx minute, annular or 10-15-toothed; ovules 2 in each cell. Flowers usually large. Climber.

1. Thunbergia.

Calyx 5-partite. Stamens 4; ovules very many in each cell. Flowers small. Erect plant.

2. Staurogyne.

Seeds supported on a retinacula. Corolla tube twisted to the left in bud :—

Ovules 3-12 in each cell :—

Corolla sub-equally 5-lobed :—

Flowers clusters separate on cyme
branches; anthers acuminate at apex.

Capsule seed bearing throughout. .. 3. *Æchmanthera*.

Ovules 2 in each cell :—

Capsule 4 or fewer seeded. Anthers
muticous :—

Corolla sub-equally 4-lobed; tube short, widened gradually from near the base. 4. **Strobilanthes.**

- Stamens 4 or 2. Corolla somewhat 2-lipped, long-slender. Stamens 2. .. 5. **Eranthemum.**
- Seeds on hardened curved retinacula; upper lip of corolla obsolete, lower 3-lobed; ovules 2 in each cell. Anterior filaments without an excurrent process. 6. **Acanthus.**
- Seeds supported on retinacula :—
- Corolla lobes imbricate in bud :—
- Ovules 3-10 in each cell. Capsule normally 4- or 6- seeded :—
- Capsule compressed. Seeds ovoid, hardly compressed. Flowers minute, thyr-soid. 7. **Andrographis.**
- Capsule subterete. Seed much compressed :—
- Corolla tube very slender, straight. Ovary pubescent. 8. **Gymnostachyum.**
- Corolla funnel-shaped, curved. Ovary glabrous. 9. **Phlogacanthus.**
- Ovules 2 or nearly 1 in each cell :—
- Corolla lobes 5, sub-equal. Anthers 2-celled :—
- Calyx segments 4, 2 opposite, larger than the others. Stamens 2, perfect, others rudimentary. 10. **Barleria.**
- Calyx segments 5, sub-equal, all small :—
- Stamens 4. Corolla tube long; limb widened. 11. **Mackaya.**
- Stamens 2 :—
- Corolla tube long, slender. .. 12. **Pseuderanthemum.**
- Corolla tube ventricose. .. 13. **Codonacanthus.**
- Corolla distinctly 2-lipped. Anthers 2-celled :—
- Stamens 4 :—
- Calyx deeply 4- or 5-partite. .. 14. **Lepidagathis.**
- Calyx 5-toothed, campanulate. .. 15. **Phialacanthus.**
- Stamens 2 :—
- Placentas separating elastically from the base of the capsule upwards. Bracts usually clustered and involu-crate. 16. **Dicliptera.**
- Placentas not separating elastically for the valves :—
- Anther-cells placed one higher up than the other :—
- Anther-cells with a minute white basal spur. 17. **Justicia.**

- Anther-cells not spurred at the base but apicular. 18. **Adhatoda.**
 Anther-cells muticous. Flowers clustered. Corolla white, long. 19. **Rhincanthus.**
 Anther-cells parallel, sub-equal:—
 Bracts large. Corolla tube narrow, long. 20. **Ecbolium.**
 Bracts small. Corolla tube ovoid, inflated, constricted at the tip. 21. **Sphinctacanthus.**

1. **THUNBERGIA** Linn. f.

Scandent shrub, rarely erect. *Leaves* palminerved, angled, often cordate or hastate. *Flowers* axillary or in racemes large or moderate sized; bracts leaf-like; bracteoles large, enclosing the flower buds. *Calyx* small, annular, usually 10-16 toothed or obscure. *Corolla* conspicuous, tube curved, ventricose, mouth oblique; lobes 5, round, twisted to the left in bud. *Stamens* 4, didynamous, inserted near the base of the corolla tube; anthers 2-celled; cells sometimes spurred at the base. *Disc* conspicuous, annular or cushion-like. *Ovary* 2-celled, 2-ovuled; style long; stigma funnel-shaped, 2-lobed or subacute or style bifid with capitate stigma. *Capsule* globose, suddenly narrowed into a flat hard sword-shaped beak. *Seeds* 2 in each cell, glabrous, often hollowed at the base. *No* retinacula.

Flowers bluish. Leaves 5-7 nerved. Calyx sub-entire. 1. *T. glandiflora.*
 Flowers orange-red. Leaves 3-5 nerved, reduced to a crenulate rim. 2. *T. coccinea.*

1. *Thunbergia grandiflora* Roxb. Vern. *Tillienru*, Synt.; *Khakkhu*, Garo; *Kukua-loti*, Ass.; *Nong-nongarikang*, Mik.; *Dumangkhlung*, *Tumakhlung*, Kach.; *Thangwakoi*, Kuki; *Jermie-khnong*, *Syntew-jarmi-chankhnow*, Khasi; *Loyga*, Naga; *Dengkakhlu*, Mech.

A large climber. *Leaves* 3-7 by 1.5-6 in., ovate or orbicular or lanceolate towards the extremity, sub-entire, often angularly toothed, membranous, scaberulous above, pubescent beneath, 5-7 nerved; lower leaves often deeply cordate; petiole upto 3.5 in. long. *Flowers* large, bluish, axillary from

the uppermost leaves or in dense flowered racemes; bracteoles conspicuous, elliptic, falcate, up to 1.5 in. long. *Calyx* subentire. *Corolla* 2-3 in. long. *Anthers* bearded, spurred. *Capsule* about 1.5 in. long, up-curved with 4-quetrous beak, thinly pubescent. *Seeds* dorsally compressed.

Common throughout the Province.

Leaves are eaten as vegetable.

Flrs. 4-7, sometimes also flowers up to beginning of cold weather.
Fr. Cold weather.

2. *Thunbergia coccinea* Wall. Vern. *Sibe-tapung*, N.-E. F. Tract; *Chonga-lota*, Ass.; *Long-long*, Mik.

An extrorse profusely branched climber with long pendent branches. *Leaves* 3-7 by 1-3.5 in., lanceolate, elliptic or ovate-lanceolate, acuminate, entire, serrate or remotely toothed, rather membranous, glabrous, 3-5 nerved; base rounded or shallow cordate; petiole .05-2 in. long. *Flowers*, usually fascicled at the nodes of lax elongated pendent racemes; bracteoles about 1 in. long, reddish. *Calyx* a minute rim. *Corolla* orange-red; lobes reflexed. *Capsule* about 2 in. long.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, NOWGONG, MANIPUR, KHASI HILLS (upto 4,000 ft.).

Flrs. 9-11. Fr. 12-2.

***Nelsonia campestris* Br.**

A diffuse herb; softly villous. *Leaves* sub-sessile, .5-1.5 by .3-.6 in., elliptic. *Flowers* bluish; sepals 4, unequal. *Corolla* tube inflated, constricted; bilabiate with 4 spreading lobes. *Stamens* 2. *Capsule* barren above; seeds globose. small, yellowish with brown granules.

GOALPARA.

Flrs. & Fr. 12-3.

2. STAUROGYNE Wall. (*Ebermaiera* Nees.).

***Straurogyne argentea* Wall.**

A common weed under dense forest with complete leaf canopy. *Leaves* usually entire, obtuse, thinly chartaceous,

1·5-4 by ·8-1·5 in., elliptic or oblong-punctate above, whitened beneath; lateral nerves 5-7 on either half; base rounded or acute; petiole ·5-1·5 in. long. *Flowers* in terminal or also axillary spikes; bracts foliaceous, 3-nerved, terminating in a bristle; bracteoles small. *Calyx* deeply divided; segments linear, awned. *Corolla* about ·6 in. long, pubescent; lobes 5, spreading, patent. *Stamens* 4, didynamous, included; filaments hairy; anthers with 2 separate muticous cells. *Disc* small. *Ovary* 2-celled; ovules numerous in each cell; style slender, bifid. *Capsule* oblong, about ·25 in. long. *Seeds* (15-30) in each cell, unripe glandular; hilum minute, hollowed, no retinacula; albumen thin.

KHASI & JAINTIA HILLS, SYLHET.

Flrs. 8. Fr. 12.

S. glauca O. Ktze.=**Ebermaiera glauca** Nees.

An erect herb, viscous pubescent. *Leaves* almost all or upper portion alternate, small, spatulate; petiole about ·2 in. long. *Flowers* purplish, striped (rose or yellow) sessile or sub-sessile in lax spikes; bracts narrow, spatulate; bracteole small, linear. *Calyx*-segments 4, sub-sessile, ·25 in. long. *Corolla* about ·3 in. long, straight, slightly pubescent. *Capsule* oblong, about ·25 in. long; seeds globose, not pitted.

AKA HILLS. (15,263), 1934.

S. Simonsii (T. Anders) O. Ktze.

A rather stout, short, erect, woody undershrub. *Leaves* 5·7 by 1·8-2·5 in., elliptic, entire, bluntly acute, glabrous, green above, pale whitish beneath; lateral nerves 8-10 on either half, prominent beneath and slightly pubescent; base cuneate; petiole upto 3 in. long, pubescent. *Flowers* pedicelled in dense paniced racemes; bracts linear. *Calyx* segments ·25·5 in. long, almost glabrous outside. *Capsule* about ·25 in. long.

KHASI & JAINTIA HILLS (2,000-2,500 ft.). Borpani, Pangtung, Shella.

Flrs & Fr. 8-12.

S. polybotrya (Nees.) O. Ktze., *S. glutinosa* (Wall.) O. Ktze., *S. paniculata* (Wall.) O. Ktze. and *S. thyrsoides* (Nees) O. Ktze. are also recorded from the Province.

3. **ÆCHMANTHERA** Nees.

Shrubs. *Leaves* nearly entire or crenate, often viscid. *Flowers* in sessile clusters forming trichotomous or second panicle bracts linear; bracteoles smaller, linear. *Calyx* 5-partite; segments linear, sub-equal. *Corolla* tubular, suddenly widened near the middle, glabrous but with 2 hairy lines on the palate within; lobes 5, sub-equal, rounded, twisted to the left in bud. *Stamens* 4, didynamous, included, longer filaments shorter, glabrous; anthers 2-celled, cells muticous. *Ovary* densely hairy at the apex; ovules 4-6 in each cell; stigma large, simple, linear-lanceolate. *Capsule* narrow, oblong, 6-8 (sometimes 12) seeded. *Seeds* discoid, densely hairy or thicker, glabrous.

Connective not ex-current:—

Seeds densely hairy (starting out when mature). 1. *Æ. tomentosa*.

Connective ex-current:—

Seeds thicker, glabrous. 2. *Æ. leiosperma*.

1. **Æchmanthera tomentosa** Nees.

A small erect shrub, villous. *Leaves* 1·5-3·5 by ·6-2 in., elliptic or ovate-lanceolate, acute or acuminate, crenate, subcoriaceous, pubescent above with stiff nerves, pubescent or tomentose beneath; lateral nerves 10-16 on either half; base rounded, often unequal; petiole ·5-1·5 in. long. *Calyx* ·4 in. long, glandular hairy. *Corolla* ·7-1 in. long. *Capsule* linear, pubescent, about ·5 in. long, retinacula hooked, strong.

K. & J. HILLS (upto 5,000 ft.).

Flrs. 8. Fr. Cold season.

Æ. tomentosa Nees. Var. *gossypina* Nees.=Var. *Wallichii* F.B.I.

Shrub 3-4 ft. in height; stem thickly fitted with white wool. *Leaves* 3-6 by 2-3·5 in., ovate, velvety tomentose, purplish when old; petiole 1-2 in. long.

K. & J. HILLS.

Flrs. 10-1. Fr. Cold season.

2. *Æchmanthera leiosperma* Clarke.

A small shrub, very hairy. *Leaves* 3 by 1·5 in., ovate or elliptic, acute, crenulate; base rounded; petiole ·5 in. long. *Flowers* in somewhat leafy panicles; bracts ·5 in., linear-ligulate; bracteoles small. *Calyx* segments sub-equal, very hairy. *Corolla* about 1 in. long. *Stamens* 4, didynamous, connective excurrent. *Capsule* ·3 in., 6-seeded.

K. & J. HILLS (3-4,000 ft.)—Clarke.

(No specimen in Forest Herbarium, Shillong—*F.B.I.* Vol. IV, p. 429).

***Micranthus oppositifolius* Wendl.=Phalyopsis parviflora Willd.**

An undershrub with creeping root-stock and angled branches; sometimes prostrate. *Leaves* in unequal pairs, 3·5 by 1·5 in., elliptic or ovate-acuminate, thinly hairy, lanceolate; base narrowed into a slender petiole. *Flowers* small, in dense terminal spikes, glandular, hairy; bracts imbricate; bracteoles absent. *Sepals* 5, one larger ovate, others smaller. *Corolla* white, ·3 in. long; tube slender; lobes contorted in bud. *Stamens* didynamous; anther-cells 2, parallel. *Style* long, hairy; ovules 2 in each cell. *Capsule* about ·2 in., 4-seeded; seeds ·06-·08 in. across.

GOALPARA, KHASI & JAINTIA HILLS.

Flrs. & Fr. 11-3.

4. STROBILANTHES Blume.

Shrubs, undershrubs or herbs, often gregarious, often flowering periodically and then dying off. *Leaves* opposite, often unequal, toothed or sub-entire, usually lanceolate as are the bracts and other green parts. *Flowers* capitate or in strobilate or interrupted spikes or paniced sessile or sometimes pedicelled; bracts and bracteoles large, small or 0. *Calyx* usually deeply 5-fid; segments narrow, usually sub-equal, rarely 2-lipped. *Corolla* tubular-ventricose, straight or curved; lobes 5, sub-equal, rounded or ovate, contorted in bud. *Stamens* usually 4, didynamous or 2; anthers oblong, 2-celled, muticous. *Disc* small or prominent as a stipe of the ovary. *Ovary* 2-celled, 2-ovules in each cell; style linear; stigma of one linear branch, the other suppressed. *Capsule* 2- or 4- seeded, the placenta sometimes separating elastically. *Seeds* much compressed, glabrous or hairy (when wetted) on strong curved retinacula.

Stamens 2 :—

- Seeds glabrous. 1. *S. adnatus*.
 Seeds hairy. 2. *S. khasyanus*.

Stamens 4 :—

Bracts persistent :—

Flowers capitate or shortly spicate :—

Seeds hairy :—

Bracts lanceolate, large, hairy :—

- Leaves scabrous. Calyx-segments
 pubescent; petiole .75 in. long. .. 3. *S. scaber*.

Bracts obovate-oblong, incised, rufous-
 hairy :—

- Leaves glabrous, lanceolate, denti-
 culate. 4. *S. fimbriatus*.

Bracts large, ovate, pectinate :—

- Leaves hairy, serrate. .. 5. *S. pectinatus*.

Bracts elliptic, crenate :—

- Leaves shortly hairy, crenate. .. 6. *S. Simonsii*.

Bracts ovate or elliptic, concave, entire :—

- Leaves elliptic-acuminate, glabrate,
 almost entire. .. 7. *S. glabratus*.

Bracts elliptic or elliptic-oblong, entire
 or toothed :—

- Leaves ovate-acute, villous, serrate. 8. *S. glomeratus*.

Flowers strobilate :—

Seeds hairy :—

- Leaves auriculate, serrulate, sparsely
 hairy. 9. *S. auriculatus*.

Leaves not auriculate :—

- Ovary scarcely hairy. Leaves large; base
 cordate. 10. *S. Sabinianus*.

- Ovary hirsute. Leaves smaller; base
 rounded. 11. *S. acrocephalus*.

Flowers in elongated spike, often much in-
 terrupted :—

Seeds hairy :—

Leaves nearly glabrous, sub-entire :—

Capsule large, about 1 in. long :—

- Bracts obovate, crenate. .. 12. *S. macrostegius*.

Capsule small, .25 in. long or less :—

- Bracts oblong. Corolla about .6 in. 13. *S. Brunonianus*.

Leaves denticulate :—

Capsule .6 in. long :—

Bracts oblong, spathulate :—

Corolla white, yellowish, 1.4 in.
 long :—

Serrate :—

- Bracts ovate, .12-.25 in. long. 14. *S. monadelphus*.

Serrate:—

Bracts obovate, spathulate:—

Corolla about 1·25 in. .. 15. *S. petiolaris*.

Leaves glabrous, serrate:—

Leaves lanceolate:—

Bracts small, linear, foliaceous:—

Corolla 1·17 in. 16. *S. tenax*.

Leaves ovate:—

Bracts oblong. Corolla scarcely ·7

in. 17. *S. maculatus*.

Leaves pubescent or hairy, remotely
serrate:—

Bracts linear-lanceolate, 1·1·5 in.

long. 18. *S. polythrix*.

Bracts caducous:—

Heads in fruit capitate (not interrupted):—

Corolla more or less purplish:—

Corolla upto about 2 in. long:—

Bracts ovate, leaf-like, large:—

Corolla purple:—

Calyx-segments glandular:—

Lateral nerves 6·7 on
either half. .. 19. *S. geniculatus*.

Bracts elliptic, small, concave:—

Calyx-segments fuscous-pubescent:—

Lateral nerves about 5 on
either half. .. 20. *S. rhombifolius*.

Bracts lanceolate, membranous,
small, ·39 in. long:—

Corolla pale violet:—

Calyx-segments glandular-
pubescent. .. 21. *S. Burkilii*.

Corolla upto about 1·5 in. long:—

Bracts more or less orbicular,
concave, whitened:—

Calyx-segments pubescent:—

Petiole ·1·2 in. long. .. 22. *S. discolor*.

Corolla lavender:—

Corolla about 1 in.:—

Leaves opposite, sub-
equal. .. 23. *S. isophyllus*.

Corolla about 1·25 in. long:—

Leaves pseudo-alternate, the
opposite leaf of each pair much
reduced or obsolete. .. 24. *S. anisophyllus*.

Heads in fruit elongate, interrupted below:—

Flowers distant:—

Bracts caducous:—

Corolla purple:—

Leaves sub-entire or toothed:—

Bracts ovate:—

Leaves lanceolate. Calyx segments

glandular, pubescent. 25. *S. pauper.*

Leaves serrate:—

Leaves ovate:—

Leaves acuminate, small. Calyx

segments glandular, pubescent. .. 26. *S. extensus.*

Leaves acute, larger. Calyx segments

hairy. 27. *S. phyllocaulos.*

Leaves denticulate; bracts lanceolate:—

Leaves elliptic-acuminate. 28. *S. denticulatus.*

Leaves serrulate. Corolla tubular:—

Bracts obovate:—

Leaves ovate-acuminate. .. 29. *S. agrestis.*

Corolla yellow without, 1.5 in., minutely

pubescent without:—

Spikes lax. 30. *S. secundus.*

Corolla pale lilac, 1.3 in. long, pilose:—

Inflorescence lax paniculate. 31. *S. arborasis.*

Corolla purple, 2 in., almost glabrous:—

Spikes dense panicles. 32. *S. flaccidifolius.*

Flowers mostly distant, alternate or panicled:—

Bracts very small, ovate:—

Corolla purplish:—

Corolla about 1.5 in.:—

Leaves elliptic or lanceolate-

serrulate, setulose. 33. *S. divaricatus.*

Corolla about 2 in.:—

Leaves oblong, sub-entirely hairy:—

Petiole .16 in. long. 34. *S. rubescens.*

Leaves ovate-crenate, glabrate:—

Petiole 1-1.5 in. long. .. 35. *S. boerhavioides.*

Bracts linear:—

Corolla creamy white:—

Leaves lanceolate, sessile, glabrous. .. 36. *S. Helictus.*

Bracts lanceolate, persistent:—

Leaves broadly lanceolate, denticulate. 37. *S. Griffithianus.*

Leaves lanceolate, minutely serrate:—

Seeds orbicular. 38. *S. elongatus.*

Leaves elliptic-serrate:—

Seeds ovate. 39. *S. nobilis.*

Upper bracts leaf-like, ovate:—

Corolla .5 in., pubescent without, persistent:—

Corolla curved:—

Leaves glabrous. 40. *S. urophyllus*.

Upper bracts ovate or spatulate, persistent:—

Corolla 1 in., almost glabrous (hairy within):—

Corolla almost straight:—

Leaves pubescent. 41. *S. stenophyllus*.

Bracts minute, persistent:—

Leaves rusty pubescent:—

Calyx segments sub-equal, pubescent:—

Corolla almost straight, puberulous. 42. *S. Panichanga*.

Bracts elliptic, caducous:—

Leaves glabrous:—

Calyx segments sub-equal, glabrous:—

Corolla ventricose, glabrous. 43. *S. coloratus*.

1. *Strobilanthes adnatus* Clarke.

An almost glabrous shrub. *Leaves* 4-8 by 1.5-3 in., broadly elliptic-acuminate, sub-entire, membranous, glabrous; lateral nerves about 10 on either half; base alternate; petiole .8-1.25 in. long. *Flowers* in dense axillary or terminal paniced spikes, which are strobiliform. *Bracts* .75 by .3 in., scarious, ovate-acute, adnate, glabrous, ciliate, persistent, reticulate; bracteoles 0. *Calyx* small, about .2 in.; segments linear. *Corolla* .3-.5 in., glabrous without. *Stamens* 2, nearly glabrous, rudimentary stamens 2. *Capsule* .3 in., 4-seeded. *Seeds* ovate, glistening, glabrous without lateral areolas.

UPPER ASSAM, NAGA HILLS, KHASI HILLS (5,000 ft.).
(F.B.I., 436 Vol. IV).

Flrs. 4. Fr. 8-11.

2. *Strobilanthes khasyanus* T. Anders.

A densely brown hirsute shrub 2-4 ft. high, somewhat glandular-viscid. *Leaves* 4 by 2 in., ovate-acuminate, crenate or serrate, thinly coriaceous, hirsute; lateral

nerves about 9 on either half; base narrowed into the petiole; petiole 1·25 in. long. *Flowers* in linear-lax axillary clustered spikes (scarcely interrupted). *Bracts* narrow-spathulate, ·25-·3 in., linear. *Calyx* teeth ·25 in., linear, somewhat accrescent in fruit. *Corolla* slender, white; tube ·5 in., funnel-shaped towards the lip; lobes ·25-·3 in., reddish patent; filaments almost glabrous; anthers much exerted. *Capsule* ·3 in., 4-seeded. *Seeds* ovate with an areola on each side (not elastic when wetted).

KHASI HILLS upto 5,500 ft. (F.B.I., 436 Vol. IV).

Flrs. 9. Fr. 1.

3. *Strobilanthes scaber* Nees. Vern. *Sam-siphra*, Garo.

A shrub upto 6-8 ft. high, gregarious; stem pubescent, joints much swollen. *Leaves* 3-5 by 1·5-2·5 in., elliptic-obovate, acuminate, crenate, scabrid, thinly coriaceous or glabrate on maturity; lateral nerves 6-8 on either half, subparallel, arcuate; base-cuneate; petiole ·6-1 in. *Flowers* yellow in hairy dense spikes, often clustered; bracts-lanceolate, green; bracteoles ·25 in., linear-oblong. *Calyx* glabrous; tube ventricose; lobes rounded. *Stamens* included; filaments hairy near the base. *Ovary* glandular at the apex; style almost glabrous. *Capsule* about ·5 in., 4-seeded. *Seeds* discoid, 1 in. in diameter, elastic when wet; areolas large, glabrous.

LAKHIMPUR (Dumardallong), KAMRUP. GARO HILLS, SYLHET (Wallich), KHASI HILLS.

Flowers are eaten cooked in Garo Hills.

Flrs. & Fr. 2-6.

4. *Strobilanthes fimbriatus* Nees.

Shrubby, glabrous. *Leaves* elliptic-oblong, acuminate, denticulate, sub-coriaceous, lanceolate; lateral nerves 7-8 on either half, slender; base acute or cuneate. *Flowers* in subsessile heads; bracts ·75 in., ovate-oblong, acuminate, incisoserrate, rufous-hairy; bracteoles ·5 in., linear. *Corolla* 1-1·5

in., glabrous without. *Capsule* .75-1 in. long, oblong, 4-seeded. *Seeds* .2 in., ovate; areolas small.

SYLHET, KHASI HILLS. (F.B.I., p. 447 Vol. IV).

Flrs. 7.

5. *Strobilanthes pectinatus* T. Anders.

A large spreading gregarious shrub. *Leaves* 2.5-5 by 1.2-3 in., elliptic-acuminate, serrate, thinly coriaceous, sparsely hairy above, villous beneath, specially along the nerves; lateral nerves 6-8 on either half, sub-parallel, arcuate; base cuneate; petiole .5-1.7 in. long, villous. *Flowers* in pedunculate hairy heads. *Bracts* large, ovate, .75-1 in.; bracteoles linear. *Calyx* segments scarious, linear-glabrous. *Corolla* purplish, 1.5-2.5 in. long, funnel-shaped, almost glabrous; filaments hairy. *Capsule* .5-.6 in. *Seeds* .16 in., ovate; areolas small.

NAGA HILLS, KHASI HILLS (4,000 ft.).

Flrs. 5-9. Fr. 2.

6. *Strobilanthes Simonsii* T. Anders.

An undershrub; branches pubescent. *Leaves* 2-6 by 1-2 in., broadly lanceolate or elliptic-lanceolate, acuminate, arcuate-serrate, sub-coriaceous, minutely lanceolate; lateral nerves 7-9 on either half, slender; base-cuneate; petiole .5-.9 in. long. *Flowers* in ellipsoid, puberulous heads; bracts about 1.2 in., elliptic, crenate, hairy; bracteole .6 in. *Calyx* .7 in. long, divided nearly to the base; segments linear-lanceolate, pubescent. *Corolla* about 2 in.; lobes unequal. *Capsule* .9 in. long.

NAGA HILLS, LAKHIMPUR, SIBSAGAR (Mikir Hills).

Fr. 12.

7. *Strobilanthes glabratus* Nees.

A shrub 3-4 ft. high. *Leaves* 3-5 by 1-1.9 in., elliptic-acuminate, crenulate-undulate or sub-entire, membranous, glabrate; lateral nerves 6-8 on either half, arching; base narrowed into the petiole upto .5 in. long. *Flowers* in ovoid-

pedunculate heads, usually glabrate; peduncles 1-2 in. long, angled or grooved. *Bracts* elliptic or ovate-elliptic, coriaceous in fruit. *Calyx* linear, scarious. *Corolla* bluish, 1-1.25 in., glabrous. *Capsule* .75 in., broadly oblong, glabrous, 4-seeded. *Seeds* .2 in., ovate; areolas small, hairy.

CACHAR (Prazer), KHASI HILLS (4,000 ft.).

Flrs. 4-5. Fr. Cold season (11).

8. *Strobilanthes glomeratus* T. Anders.

A gregarious shrub 2-5 ft. high; young branchlets horizontal, hairy. *Leaves* 3-5 by 1.5-2.9 in., ovate or ovate-elliptic, acuminate, crenate or serrate, membranous, villous; lateral nerves 5-6 on either half; base narrowed into the petiole, usually unequal; petiole .3-1 in. long. *Flowers* bluish, more in ovoid, sub-sessile, hairy heads. *Bracts* foliaceous, hairy, outermost pair serrate; bracteoles linear-lanceolate. *Calyx* .5-.7 in.; segments linear-oblong, membranous. *Corolla* about 2 in. long; filaments sparsely hairy. *Capsule* .75 in., broadly oblong, 4-seeded. *Seeds* .16 in., silky hairy; areolas very small.

GARO HILLS (4,000 ft.), N. E. F. TRACT, SYLHET, KHASI HILLS (4,000 ft.).

Flrs. 10-11. Fr. 12-1.

9. *Strobilanthes auriculatus* Nees.

A shrub 3-6 ft. high. *Branches* quadrangular, usually zigzag, pleasantly aromatic. *Leaves* very variable, sometimes upto 12 ft. long, 3-6 by 1.25-2.5 in., elliptic-lanceolate or elliptic-oblong, acuminate, serrulate, membranous, sparsely hairy above, specially along the nerves, glabrous beneath with numerous cystolith cells; lateral nerves usually 10-15 on either half, sub-parallel, arcuate, base auricled, sub-cordate, sessile. *Flowers* bluish in narrow hairy spikes 3-5 in. long. *Bracts* imbricating .3-.6 in., obovate or obcordate, often recurved on fruit. *Calyx* segments .25-.3 in., linear, softly tomentose. *Corolla* 1 in. long, upper portion campanulate, lower portion short, sparsely hairy; limb more or less bilabiate. *Stamens* almost glabrous. *Capsule* .3 in., glabrous,

4-seeded. *Seeds* .08 in., orbiculate, elastically hairy (white); areolas small.

KHASI HILLS, MANIPUR.

Flrs. 10-2. Fr. Hot season and rainy season ?

10. *Strobilanthes Sabinianus* Nees.

A shrub glabrous. *Leaves* 4-6 by 1.5-3.2 in., broadly elliptic to elliptic-lanceolate, acuminate, undulate or obscurely crenate, rather membranous, lanceolate on both surfaces; lateral nerves 5-6 on either half, slender, oblique; base narrowed into the petiole or sometimes rounded; petiole .1-.5 in. long. *Flowers* in pubescent spikes. *Bracts* .3 by .2 in., obovate or obcordate, pubescent; bracteoles .25 in., lanceolate-pubescent. *Calyx* about .5 in. long, deeply cleft; segments lanceolate, sub-verrucose, coriaceous. *Corolla* about 1.25 in., glabrous (Hooker), pilose without (Clarke), (I have seen only glabrous). *Capsule* .3 in. long, pilose. *Seeds* 4, densely spinulate, orbicular, .08 in.

KHASI HILLS (4,000 ft.).

Flrs. & Fr. 11-1.

11. *Strobilanthes acrocephalus* T. Anders.

An undershrub 2-3 ft. high, somewhat gregarious; young parts hirsute. *Leaves* 1-2 by .5-1 in., ovate-acute, crenate, membranous, hirsute, specially along the nerves; lateral nerves 6-7 on either half; base rounded; petiole .3-.5 in. long. *Flowers* bluish purple or mauve in solitary cylindric peduncled spikes; peduncles hirsute. *Bracts* .3-.5 in., ovate, margins ciliate; bracteoles oblong, spatulate. *Calyx* .5 in.; segments oblong, hairy. *Corolla* about 1 in., glabrous; limb more or less bilabiate. *Stamens* glabrous. *Ovary* hirsute; style sparsely hairy. *Capsule* .25 in., hairy, 4-seeded. *Seeds* .08 in., orbicular, pubescent when young; areolas 0.

NAGA HILLS, KHASI HILLS (5,000 ft.).

Flrs. 9-1. Fr. 3.

12. *Strobilanthes macrostegius* Clarke.

A large shrub. *Leaves* 5-9 by 1-3.5 in., elliptic, elliptic-oblong, acuminate, sub-entire, coriaceous, lanceolate above,

sparsely hairy beneath, specially along the nerves; lateral nerves 9-12 on either half, prominent, arcuate; base cuneate; petiole 1-1.5 in. long. *Flowers* (in opposite pairs) in lax axillary spikes, scarcely interrupted. *Bracts* about 1 in., linear-acuminate; bracteoles .6 in., cuspidate. *Calyx* .7 in. long, deeply but sub-equally 5-cleft.; segments linear-glabrous, enlarged in fruit. *Corolla* pale purple, 1.5 in. long; lobes 5-notched. *Capsule* .9-1.2 in. long, 4-seeded. *Seeds* .2 in., ovate; areola obsolete.

N. E. F. TRACT (Pasighat), KHASI HILLS.

Flrs. & Fr. 11-2.

13. *Strobilanthes Brunonianus* Nees.

An erect dense shrub 2-3 ft. *Leaves* 2-4 by .3-.4 in., lanceolate, sub-entire or undulate, crenate, acute, membranous, sparsely hispid above, glabrous beneath; nerves obscure; base alternate; petiole .2-.4 in. long. *Flowers* bluish; spikes somewhat paniculate, usually interrupted towards the base. *Bracts* .25-.3 in., oblong; bracteoles .2 in., oblong. *Calyx* segments .25 in. *Corolla* pubescent without, curved. *Stamens* glabrous. *Capsule* .25 in., oblong, pubescent, 4-seeded. *Seeds* .1 in., orbicular, pubescent; areolas 0.

NAGA HILLS, KHASI HILLS (4,000 ft.).

Flrs. 9-11. Fr. 12-1.

14. *Strobilanthes monadelphus* Nees.

A rigid shrub; branches quadrangular, scaberulous. *Leaves* 2-4 by .7-2 in., ovate, ovate-lanceolate, acuminate, serrate, sub-coriaceous, lanceolate and pubescent on both surfaces; lateral nerves 9-12 on either half, slender, prominent beneath; base narrowed into the petiole or cuneate; petiole .3-1.5 in. long. *Bracts* .12-.25 in., wide towards the base. *Seed* .1 in. in diameter, pubescent allied to *S. maculatus*, specially in flowers and inflorescence.

K. & J. HILLS (4,000 ft.).

Flrs. 11.

15. *Strobilanthes petiolaris* Nees.

Shrubby, lax. *Leaves* ovate-acuminate, almost glabrous; base narrowed into the petiole; lateral nerves 7 on either half. *Flowers* in linear paniced hairy spikes; bracts obovate, spathulate. *Corolla* purplish or rose, 1.25 in. long, ventricose.

ASSAM (Griffith). (No specimen in Forest Herbarium, Shillong. F.B.I., IV. P. 458).

16. *Strobilanthes tenax* Dunn.

Leaves 3-4 in. long, lanceolate-acuminate, acute, serrate, glabrous, cystolith-linear; lateral nerves 6 on either half, prominent beneath; base acute, lower bases shortly petiolate, upper serrate. *Flowers* in lax panicle; bracts small, linear, foliaceous, persistent. *Calyx* .4 in. long. *Corolla* tubular, 1.17 in. long; base .1-.15 in. across; lobes 5, rounded, patent. *Stamens* 4. *Ovary* 4, ovulate. *Capsule* oblanceolate, .59 in. long. *Seeds* 2.

N. E. F. TRACT (Kobo) (Burkill's No. 56785).

Flrs. 3.

17. *Strobilanthes maculatus* Nees.

A shrub. *Leaves* 4-6 by 1.4-3 in., ovate, ovate-lanceolate, acuminate, serrate, rather membranous, lanceolate on the upper surface; lateral nerves 9-11 on either half, slender; base alternate; petiole .1-2.5 in. long. *Flowers* in terminal paniced hairy spikes, somewhat interrupted at the base. *Bracts* oblong. *Calyx* .2-.3 in., 5-cleft; segments linear-oblong, unequal, hairy. *Corolla* blunt or lavender, about .6 in. long, ventricose, somewhat curved; lobes roundish, reflexed. *Stamens* glabrous, 1-adelphous. *Capsule* .25 in., oblong, pubescent, 4-seeded. *Seeds* .05-.06 in. across, orbicular, shaggy with long hairs; areolas rather small.

KHASI HILLS (2,500 ft.). (F.B.I., p. 457 Vol. IV).

Flrs. 10-11.

18. *Strobilanthes polythrix* T. Anders.

A shrub, branches terete with patent long rufous hairs. *Leaves* 4-6·5 by 1·5-2·5 in., elliptic-acuminate, distantly serrate, sub-coriaceous, rufous hairy (more scattered above); base usually rounded; petiole ·5-1 in. long, rufous-hairy. *Flowers* in axillary sub-sessile, partly rufous-hairy spikes. *Bracts* 1-1·5 in., linear-lanceolate; bracteoles about ·7 in., linear, rufous-ciliate. *Calyx* deeply cleft; segments linear-lanceolate, rufous-ciliate. *Capsule* about ·8 in. long, linear-oblong, glabrous, 4-seeded. *Seeds* ovate, silky; areolas almost obsolete.

NAGA HILLS, KHASI HILLS.

Fr. 8.

19. *Strobilanthes geniculatus* Clarke.

A small shrub, glabrous. *Leaves* 2-5 by 1-1·6 in., elliptic-acuminate, serrate, rather coriaceous, glabrous; lateral nerves 6-8 on either half, slender; base acute, rounded or shallow cordate; petiole ·1-·2 in. long. *Flowers* in few flowered heads; peduncles 1-3 with a node carrying 2 reduced caducous leaves at the middle, they are geniculate and sometimes divided. *Bracts* large, ovate-acuminate. *Calyx* ·2-·3 in., deeply cleft; segments linear, unequal, glandulous, somewhat enlarged in fruit. *Corolla* purplish, 1·2-1·8 in. long, glabrous. *Capsule* ·5 in. long. *Seeds* ·1 in. long, ovate; areolas small.

MISHMI HILLS, N. E. F. TRACT (Kolio, Pasighat), KHASI HILLS (4,000 ft.).

Flrs. & Fr. 2.

20. *Strobilanthes rhombifolius* Clarke.

A branched shrub. *Leaves* sub-sessile, often unequal, 3·5 by 2 in., rhomboid-ovate, acute, glabrous, remotely serrulate, lineolate on both surfaces; base acute; lateral nerves 5 on either half. *Peduncles* 1-3 headed; heads ·5 in. across; bracts small, elliptic, concave, caducous; brac-

teoles 0. *Calyx* divided nearly to the base, .2-.3 in. *Corolla* 1.5 to 1.7 in. long, almost glabrous, purple mouthed.

ASSAM (Jenkins).

(No specimen in Forest Herbarium, Shillong. F.B.I., IV. P. 461).

21. *Strobilanthes Burkilii* Dunn.

A small shrub. *Leaves* 2.3-3.5 in., sub-sessile, oblong-lanceolate, acuminate, shortly dentate-serrate, cystoliths scarcely linear; lateral nerves 6 on either half, prominent beneath; base oblique, obtuse. *Flowers* capitate, peduncles slender, .8-2 in. long; bracts lanceolate, .4 in. long, membranous, glabrous, early caducous, cicatrix small, conspicuous. *Calyx* divided to base, linear-lanceolate. *Corolla* tubulose; lobes 5, rounded, .08-.12 in. long. *Stamens* 4. *Ovary* 4-ovulate. *Capsule* oblanceolate, .5 in. long. *Seeds* 2, rugulose, glabrous.

N. E. F. TRACT (Kobo and Pasighat, Burkill's No. 37107) allied to *S. geniculatus* C. B. Clarke.

Flrs. 12.

22. *Strobilanthes discolor* T. Anders.

A shrub, allied to *S. pentstemonoides*. *Leaves* 2.4-5 by 1.2 in., elliptic, crenate-dentate, acuminate, coriaceous, lineolate (raphides) on both surfaces; base narrowed into the petiole or obtuse; petiole .1-.2 in. long, or almost sessile. *Flowers* in paniculate cymose heads. *Calyx* .2 in., divided nearly to the base; segments linear-lanceolate, pubescent, somewhat enlarged in fruit. *Corolla* 1.5 in. long, glabrous. *Capsule* .6 in. long, sparsely pubescent towards the apex.

SIBSAGAR, N.-E. F. TRACT, MANIPUR, NAGA HILLS and KHASI HILLS.

Flrs. & Fr. 7-1.

Some specimens collected in N.-E. F. Tract have got leaves 8.5 by 3 in., and petiole upto .5 in. long.

23. *Strobilanthes isophyllus* T. Anders.

An almost glabrous undershrub (cultivated). *Leaves* 2-5 by .4-.6 in., narrow lanceolate or ovate-lanceolate, acu-

minate, sub-coriaceous, undulate, glabrous, both surfaces lineolate (covered with raphides); lateral nerves 4-5 on either half, very oblique; base alternate; petiole .2-.4 in. long. *Flowers* tawny-coloured in cymose heads. *Bracts* .2 in., green, elliptic-obtuse; bracteoles .2 in., linear-oblong, green, almost glabrous. *Calyx* .25 in. long; segments sub-linear. *Corolla* about 1 in. long, curved with more or less cylindric base; lobes roundish. *Stamens* hairy. *Capsule* about .3 in., glabrous, 4-seeded. *Seeds* .1 in., ovate, silky; areolas usually absent.

KHASI HILLS, SYLHET. (Cultivated).

Flrs. 12-2. Fr. 4.

24. *Strobilanthes anisophyllus* T. Anders.

A shrub 2-3 ft. high; stem zigzag. *Leaves* 1.5-3.5 by .5-1.2 in., (opposite leaf of each pair absent or much smaller) lanceolate-acuminate, serrulate, glabrous, covered with lateral nerves about 4 on either half; base obtuse or rounded, sometimes narrowed into the petiole .2 in. long. *Flowers* lavender in cymose heads. *Bracts* elliptic, green. *Calyx* segments .3 in. long, linear-oblong, pubescent without. *Corolla* pale-purple, glabrous, 1.25 in. long (resembles *S. isophyllus* except the zigzag stem and unequal broader leaves). *Capsule* .4-.5 in. long.

SYLHET, GARO HILLS (1,200 ft.), KHASI HILLS (4,000 ft.).

Flrs. 11-12. Fr. 2-3.

25. *Strobilanthes pauper* Clarke.

A small shrub. *Leaves* 3.5 by .7-1 in., lanceolate-acuminate, minutely toothed or sub-entire, glabrate or puberulous beneath, obscurely lineolate; lateral nerves 6-7 on either half; base narrowed into the petiole .5-1 in. long. *Heads* interrupted in fruit; bracts green, somewhat pubescent, caducous. *Calyx* 5-partite; segments sub-equal, linear-spathulate, glandular-pubescent. *Corolla* about 1.5 in., purple, almost glabrous. *Stamens* glabrous. *Capsule* 4-seeded, pubescent, .5 in. long. *Seeds* .1-.12 in., ovate, shaggy.

KHASI HILLS (4-6,000 ft.) (H. f. & T.). (No specimen in Shillong Forest herbarium, F.B.I., Vol. IV. P. 463).

26. *Strobilanthes extensus* Nees.

A small erect shrub, hairy. *Leaves* 1-2 by .5-1 in., ovate-serrate or sub-entire, acuminate, sub-coriaceous, hairy from near the base; lateral nerves 4-5 on either half, emerging, slender, arcuate; base cordate or rounded, sessile or subsessile. *Flowers* in spikes interrupted towards the base; bracts .2-.3 in., ovate, glandular, deciduous. *Calyx* .3-.5 in. long, deeply cleft; segments linear-oblong, glandular pubescent, slightly enlarged in fruit. *Corolla* 1-1.5 in., purplish, curved, glabrous. *Stamens* glabrous; style sparsely hairy. *Capsule* .6 in. long, 4-seeded. *Seeds* .12 in., ovate, hairy; areolas small.

NAGA HILLS, KHASI HILLS (4,000-5,500 ft.).

Flrs. 8-9. Fr. 11.

27. *Strobilanthes phyllocaulos* Clarke.

A stout shrub; branches hairy. *Leaves* about 3.5 by 1.5 in., ovate-acute, serrate, densely hairy above, softly and patently hairy beneath; lateral nerves about 8 on either half; petiole short; spikes long, dense, interrupted below in fruit similar to *Strobilanthes extensus*.

KHASI HILLS (5,000 ft.) Mawflong (J. D. H.).

(No specimen in Shillong Forest herbarium. F.B.I., Vol. IV. P. 464).

28. *Strobilanthes denticulatus* T. Anders.

A shrub; branches quadrangular, minutely puberulous and harsh. *Leaves* 3-6 by 1-2.5 in., elliptic or ovate-elliptic, acuminate, crenate-denticulate, sub-coriaceous (raphides) lanceolate on both surfaces, paler beneath; lateral nerves 8-14 on either half, sub-parallel, arcuate; base narrowed into the petiole, .5-2.5 in. long; the petiole is often very unequal in opposite pair of leaves. *Flowers* in interrupted spikes. *Bracts* linear-lanceolate, .4-.6 in. long, sparsely hairy, bracteoles .3 in. long. *Calyx* 1.5 in., glabrous. (The Assam collection I have examined are glabrous (pubescent F.B.I.); filaments

hairy (Nees). *Capsule* .5-.6 in. *Seeds* .15 in., ovate-pubescent; areolas small.

PATKOI MOUNTAINS, KHASI HILLS (4,000-6,000 ft.), NAGA HILLS.

Flrs. 9-12. Fr. 2.

29. *Strobilanthes agrestis* Clarke.

An erect undershrub. *Leaves* 4 by 2 in., often unequal, ovate-acuminate, sparsely hairy above, minutely pubescent beneath, serrulate, minutely lineolate on both surfaces; base shortly acuminate; lateral nerves 6 on either half; petioles .2-.5 in. *Spikes* 1-4 in., hairy, elongate, paniculate, with capitellate tips; bracts .25 in.; bracteoles .06 in., linear-oblong. *Corolla* slightly curved, narrowly tubular, ventricose, lavender. *Capsule* 4-seeded, sparsely pubescent.

KHASI HILLS.

Var. hemoitis; one leaf of every pair sessile, cordate, less than $\frac{1}{4}$ the length of the other.

(No specimen in Shillong Forest Herbarium. F.B.I., IV. P. 466).

30. *Strobilanthes secundus* T. Anders.

Leaves 2-6 by 1.5-3 in., elliptic, bluntly acute, crenate or sub-entire, sub-coriaceous, almost glabrous; lateral nerves 6-8 on either half; base acute; petiole .2-.5 in. long. *Flowers* yellow in lax long spikes; bracts caducous. *Calyx* divided nearly to the base, unequal, linear, .5-.6 in., enlarged in fruit. *Corolla* curved, about 1 in. long. *Capsule* about 1 in., 4-seeded. *Seeds* ovate, .12-.16 in., areolas small.

UPPER ASSAM, N.-E. F. TRACT, MISHMI, DUFFLA, AKA, NAGA and KHASI HILLS.

Flrs. 12-1. Fr. 2-3.

31. *Strobilanthes arborasis* Dunn.

Leaves 2-3 by 5-5 in., sessile, lanceolate-acuminate, obscurely crenate, glabrous, cystoliths punctiform; lateral nerves 6-7 on either half, prominent above. *Flowers* in lax panicles; bracts ovate, .23 in. long. *Calyx* divided, linear-laciniate; segments acute. *Corolla* pale lilac, tubulose, 1.35

in. long; lobe 5, rounded. *Stamens* 4. *Ovary* 4, ovulate. *Capsule* oblanceolate, .58 in. long. *Seeds* 4, rugulose, glabrous.

N.-E. F. TRACT (Sadiya, Kobo) Makum.

(Burkill's No. 35757).

Flrs. 11.

32. *Strobilanthes flaccidifolius* Nees. Vern. *Raspat*, Sibsagar.

A shrub. *Leaves* 2.5 by 1.2 in., elliptic or bluntly acute, obscurely crenate, membranous; lateral nerves 6-7 on either half; base cuneate, narrowed into the petiole 1 in. long. *Flowers* in densely paniced lax spikes, usually opposite; bracts ovate, deciduous. *Calyx* segments linear-spathulate. *Corolla* 2 in. long, glabrous. *Capsule* .75 in., not included at base.

SIBSAGAR, MANIPUR, NAGA HILLS, KHASI HILLS.

Cultivated for a blue dye.

Flrs. 12-2.

33. *Strobilanthes divaricatus* T. Anders.

An erect almost glabrous shrub 2.5 ft. high, gregarious. *Leaves* 2.5.5 by .5.1.8 in., lanceolate or elliptic-lanceolate, long acuminate, serrulate, membranous, obscurely setulose; lateral nerves 4-6 on either half; base cuneate; petiole .3.8 in. long. *Flowers* purple in divaricate lax zigzag spikes; bracts very small, caducous, ovate. *Calyx* .3.1 in., segments narrow-elongate, caudate. *Corolla* 1.5 in., curved, tubular. *Stamens* glabrous. *Capsule* .5 in., glabrate, 4-seeded. *Seeds* 1 in., ovate, pubescent; areolas small.

KHASI HILLS (5,000 ft.).

Flrs. 10-11. Fr. 12-1.

34. *Strobilanthes rubescens* T. Anders.

A flexuous suberect shrub; branches sparsely pubescent. *Leaves* 2.3.5 by .8.1.5 in., ovate-acuminate, subentire, coriaceous, hairy; lateral nerves 5-6 on either half, upper sessile,

base cordate, lower sub-sessile; base rounded. *Flowers* in paniculate laxly flowered spikes. *Bracts* .12 in., ovate; bracteoles linear. *Calyx* .3-.5 in., deeply cleft; segments linear-lanceolate, glabrous, slightly enlarged in fruit. *Corolla* purplish, .8-1.2 in. long, almost straight, glabrous; lobes 5, rounded. *Capsule* .6 in. long, glabrous, 4-seeded. *Seeds* ovate; areola small.

KHASI HILLS (4,500 ft.).

Flrs. & Fr. Cold season.

35. *Strobilanthes boerhavioides* T. Anders.

A gregarious shrub upto 6-8 ft. high; stem terete, glabrous. *Leaves* 3-6 by 2-3 in., ovate, long acuminate, crenate, very dissimilar in the same pair, glabrous, dark green; lateral nerves 6-8 on either half, sub-parallel, acuminate; base obtuse or subcordate; petiole .8-1.5 in. long. *Flowers* in pairs in lax axillary spikes; bracts broad-ovate, .1 by .08 in. *Calyx* segments linear-lanceolate, whitish, all equal. *Corolla* bluish purple, glabrous, membranous; tube .75 in. long, mouth about .3 in. across; lobes orbicular, equal, notched at the apex or emarginate. *Capsule* .4-.5 in. long, glabrous, oblanceolate, almost terete.

KHASI HILLS (5,000 ft.).

Flrs. 9-10. Fr. 10-11.

36. *Strobilanthes Helictus* T. Anders.

A shrub; young branchlets often pubescent. *Leaves* elliptic, elliptic-lanceolate, acuminate, serrate, membranous, glabrous, lineolate above; lateral nerves 6-7 on either half, oblique, quite conspicuous; base obtuse or cuneate; petiole .5-1.25 in. long. *Flowers* alternate in lax zigzag elongated spikes. *Bracts* linear .4-.5 in. *Calyx* .8-1 in., segments linear-lanceolate, acuminate, enlarged in fruit, sparsely hairy. *Capsule* .6-.75 in. long, 4-seeded, glabrous. *Seeds* .16 in., ovate, pubescent; areolas very small.

NAGA HILLS, KHASI HILLS (4,000 ft. Griffith).

Flrs. 9-10. Fr. 11-2.

37. *Strobilanthes Griffithianus* T. Anders.

A large shrub 3-7 ft. *Leaves* 3-7 by 1·2-2 in., lanceolate or elliptic-lanceolate, acuminate, denticulate or subentire, coriaceous, lineolate on both surfaces; lateral nerves 8-10 on either half, oblique, sub-parallel; base cuneate; petiole ·2·7 in. long. *Flowers* distant in paniced pubescent spikes. *Bracts* lanceolate, obtuse, persistent, opposite, unequal, about 1 in. or more; bracteoles ·25 in., linear-oblong. *Calyx* ·4·5 in., divided nearly to the base; segments unequal, linear, pubescent, one longest. *Corolla* yellowish about ·2 in. long; tube linear-cylindric as long as the upper ventricose half. *Stamens* hairy. *Capsule* ·6·8 in., glabrous, 4-seeded. *Seeds* ·15 in. across, sub-orbicular, sparsely pubescent; areola small.

KHASI HILLS (2,000 ft.).

Flrs. & Fr. Cold season.

38. *Strobilanthes elongatus* Clarke.

A glabrous shrub. *Leaves* 4·25 by 1·25 in., lanceolate-acuminate, minutely serrulate, densely lineolate above; base cuneate; lateral nerves 11 on either half; petiole ·25 in. long. *Flowers* alternate and opposite, distant in very long lax axillary or quasi-terminal spikes; bracts lanceolate, persistent; bracteoles linear, shorter than the bracts. *Calyx* segments linear-lanceolate, glabrous, ·3 in. *Capsule* ·2·3 in., 4-seeded, glabrous.

Namrup—LAKHIMPUR.

(No specimen in Shillong Forest Herbarium. F.B.I., Vol. IV. P. 470).

39. *Strobilanthes nobilis* Clarke.

A shrub, gregarious. *Leaves* 4-8 by 2-3 in., elliptic, unequal sided, acuminate, serrate, coriaceous, lineolate above, glabrous and paler beneath; lateral nerves 10-12 on either half; base cuneate or narrowed into the short petiole, upper leaves almost sessile. *Flowers* in flexuous, paniced, pubescent spikes. *Bracts* about 1 in., lanceolate, acute, persistent, hairy; bracteoles about ·7 in. long, linear-lanceolate. *Calyx* ·6 in.;

segments almost free, linear, scaberulous. *Corolla* not seen. *Capsule* .8 in. long, glabrous. *Seeds* 4, ovate, .16 in. long; areola small.

K. & J. HILLS (3,500 ft.).

Flrs. 11.

40. *Strobilanthes urophyllus* Nees.

An undershrub. *Leaves* 2.5.5 by .8-1.5 in., elliptic-lanceolate, acuminate, obscurely crenate, membranous, glabrous; lateral nerves 5-8 on either half; base cuneate; petiole 1-1.5 in. long. *Flowers* scattered on small leafy branchlets. *Bracts* green, foliaceous. *Calyx* .2-.3 in.; segments linear, enlarged in fruit, hairy. *Corolla* .6-.8 in., curved, finely hairy outside. *Capsule* .3-.5 in., 4-seeded. *Seeds* .12 in., ovate, pubescent; areolas very small.

KHASI HILLS (4,000 ft.).

Flrs. 3. Fr. 11.

41. *Strobilanthes stenophyllus* Clarke.

A small erect densely branched shrub. *Leaves* 2.25 by .3 in., narrow-lanceolate, denticulate, undulate or sub-entire, bluntly acuminate, glabrous above, pubescent along the nerves beneath; nerves 5-6 on either half; base attenuate. *Flowers* in axillary or terminal glabrous spikes; lower bract foliaceous; upper spatulate; bracteoles very small, ovate. *Calyx* segments .3-.5 in., subequal, linear-obtuse. *Corolla* about 1 in., almost straight, hairy within; cylindric tube shorter than the ventricose upper portion; lobes rounded. *Stamens* hairy upwards. *Ovary* glabrous; style sparsely hairy. *Capsule* .6 in. *Seeds* 4, ovate, pubescent, .12-.16 in.; areolas obsolete.

KHASI HILLS (Barapani C. B. Clarke 16362). (F.B.I., Vol. IV. P. 473).

Flrs. 10.

42. *Strobilanthes Panichanga* T. Anders.

A shrub; branches tetragonous; young parts pubescent. *Leaves* 4-7 by 1.5-3 in., broadly elliptic, acuminate, serrate,

membranous, lineolate, pubescent on the nerves; lateral nerves 9-10 on either half, parallel, arcuate; base cuneate; petiole .5-1 in. long, pubescent. *Flowers* in trichotomous cymose panicles. *Bracts* and bracteoles linear, pubescent. *Calyx* deeply 5-cleft; segments linear-lanceolate, pubescent. *Corolla* about 1 in., finely hairy, almost straight; lobes roundish. *Capsule* (not seen) more than .5 in. (Hooker).

SYLHET (Wallich), CACHAR (Keenan).

43. *Strobilanthes coloratus* T. Anders.

A glabrous undershrub in shady localities. *Leaves* 2.5-6 by 1.5-3 in., ovate or elliptic-lanceolate, acuminate, glandular, crenate-serrate, glabrous, often copper coloured; lateral nerves about 7 on either half, arcuate, more prominent above, base rounded or cuneate; petiole .3-1.8 in. long. *Flowers* purplish on large terminal cymose panicles. *Bracts* .25 by .16 in., light green, ovate or elliptic. *Calyx* 1.5 in. long, with raphides outside, 5-cleft; segments green, .3 in. long, lanceolate, curved. *Corolla* tube .5-.6 in. across, narrowly funnel-shaped; lobes subequal. *Stamens* 0, included; style slightly exserted. *Capsule* .3-.5 in. long, 4-seeded. *Seeds* .12-.16 in., ovate, pubescent; areolas scarcely any.

N. E. F. TRACT, LAKHIMPUR, AKA HILLS, GOALPARA, KHASI HILLS (5,000 ft.).

Flrs. & Fr. Cold season.

S. furcatus Biswas.

An undershrub; branches terete, not furfuraceous. *Leaves* 2.5-5.5 in. long, .8-1.5 in. broad, sub-petiolate, somewhat tapering to the base, distantly crenate along the margin, finely lineolate on both the surfaces, somewhat glaucous beneath, acuminate at the apices, the leaves forming an angle of 60°-90° at the point of attachment. *Inflorescence* spicate, furcate, very rarely terminal, never congested above, almost smooth, 2.4-8 in. long, more or less divergent in older branches, nearly smooth. *Bracts* almost equal to the calyx lobes, very finely lineolate on the exterior, oblong-ovate or elliptic-lanceolate, acute or acuminate. *Calyx* lobes equal to or longer than the bracts, more or less very finely lineolate, .33-.4 in. long and

·05-·1 in. broad. *Corolla* elongate, ·4 in. broad. *Stamens* 4, didynamous. *Style* long, linear. *Fruits* not seen.

Panglo woods, JAINTIA HILLS. 4-5,000 ft. May 1878 No. 914 (Type in Calcutta Herbarium).

The specimen is allied to *S. lancifolius* T. Anders. But it is easily distinguished from *S. lancifolius* by its furcate, rather divergent, axillary glabrous, spicate arrangement of the racemes. The bracts and calyx-segments are all very finely lineolate on the exterior and are nearly equal in length but the bracts are often slightly larger, more subulate at the apices, *S. lancifolius* is distinctly marked by its terminal crowded nature of the inflorescence, glandular hairy or pubescent bracts and calyx-segments and the bracts being nearly half the size of the calyx lobes. The leaves of *S. furcatus* are sub-petiolate, not oblong-elliptic, more furcate at the base, petiole smaller and cre-nation more distant. Flowers also are more or less smaller in size.

Flrs. 5.

S. parryorum Fischer.

A tall shrub; branches terete, brownish tomentose towards the apex, lower parts glabrous. *Leaves* 4·4-8·4 by 1·5-4·4 in., ovate-elliptic, denticulate, acuminate-glabrous when mature, often minutely hispid on the nerves beneath, minutely lanceolate; lateral nerves 8-12 on either half, arcuate. *Spikes* terminal and axillary, interrupted. *Flowers* in opposite pairs; bracts ·5-1·2 in. long, oblong, spatulate, rounded at the apex, densely brown tomentose; bracteole 2·4-6 in. long, linear-obtuse. *Calyx*-segments 5, sub-equal, almost free, linear-obtuse. *Corolla* 1·4 in. long, white, yellowish, tubular, ventricose, slightly curved, sparsely puberulous outside, usually glabrous inside; lobes sub-equal, broadly oblong, obtuse, ·2 in. long. *Stamens* 4, anthers linear, ·17 in. long, ventrically sparsely ciliate; base short, bilobed. *Ovary* narrowly fusiform, laterally compressed, glabrous, ·25-·3 in. long; ovules 4; style filiform, glabrous. *Capsule* narrowly clavate, apiculate, glabrous, ·6 in. long. *Seeds* 4, suborbicular, ·16 in. long, hygroscopically shaggy or hairy.

ASSAM (Lushai Hills—Darzo 4,600 ft.) (No. 155 Mrs. N. E. Parry-March).

S. pentstemonoides T. Anders.

Rather herbaceous 3-8 ft., much branched, even grained. *Leaves* 3-8 by 1·5-2·8 in., elliptic, elliptic-lanceolate, acuminate, serrate, coriaceous, glabrous, lanceolate; lateral nerves 6-9 on either half; base narrowed into the petiole (sometimes rounded); petiole ·2-·4 in. long. *Flowers* in peduncled heads, sometimes paniced; peduncles hairy. *Bracts* orbicular, whitish. *Calyx* ·25 in., pubescent, accrescent

in fruit; segments linear. *Corolla* 1·5 in. long, purplish, glabrous, somewhat curved. *Stamens* glabrous. *Capsule* ·6-1 in. long, glandular-pubescent, 4-seeded. *Seeds* ·12 in., silky; areolas very small.

NAGA HILLS, SIBSAGAR, DUFFLA HILLS.

Flrs. 11-1. Fr. 2-3.

S. mastersi *T. Anders.*

An erect shrub; stem tetragonous; young branches glandular, hairy. *Leaves* 4·5-6 by 1·25-1·8 in., lanceolate-acuminate, serrate, subcoriaceous, glabrate; lateral nerves 7-9 on either half, oblique; base obtuse or acute; petiole ·05-·2 in. long. *Flowers* in dichotomous lax panicles, glandular; viscous; bracts-lanceolate, acute, sparsely glandular-deciduous. *Calyx* ·3-·4 in., deeply divided; segments linear-glandular, viscous, equal. *Corolla* about 1 in., funnel-shaped, almost straight, glabrous; lobes-obscure. *Stamens* included. *Capsule* oblan- ceolate-elongate, tip glandular, 4-seeded (Hooker).

(No specimen in Shillong Forest herbarium).

ASSAM (Masters, Simons).

S. spicatus *T. Anders.*

An undershrub, pubescent. *Leaves* 1-3 by ·5-1·9 in., ovate or ovate-lanceolate, acute, serrate, subcoriaceous, tomentose, paler beneath; lateral nerves 6-8 on either half; base obscurely cordate or rounded; petiole ·05-·15 in. long. *Flowers* in terminal elongated spikes. *Bracts* foliaceous, ovate, pubescent; bracteoles spatulate. *Calyx* ·5 in.; segments unequal, linear, pubescent. *Corolla* bluish purple, 1·5 in., funnel-shaped, glabrous. *Capsule* ·5-·6 in., 4-seeded, hairy at the apex. *Seeds* ·08 in. across, suborbicular, pubescent; areola almost obsolete.

KHASI HILLS.

Flrs. & Fr. Cold season.

S. trichophorus *C. E. C. Fischer.* Vern. *Samboda*, Garo.

Undershrub. *Stem* woody, slender, erect, 15-35 in. long, terete below, quadrangular upwards, sharply so and almost winged near the apex, hairy with long white spreading hairs above. *Leaves* 3·2 in. long, 1·2 in. wide, elliptic-lanceolate, acute, membranous, pellucid-dotted, upper surface with numerous punctiform and shortly linear cystoliths, white-hairy and dark-green above, more sparsely and pale below, margins undulate-crenate; base rounded or slightly cordate; petioles less than ·7 in. long. *Spikes* axillary, simple or with a short

branch near the base, interrupted, upto .5 in. long; rhachis sharply quadrangular, pubescent and beset with long spreading soft white septate hairs; bracts in opposite pairs, .25 in. apart, spatulate, obovate, subacute, thick, green, .4 in. long, .2 in. wide, 5-ribbed, densely hairy on both faces with mixed short and long hairs, many of them gland-tipped, and with longer soft white hairs. *Flowers* solitary in each bract. *Calyx* sessile, .4 in. long, tube very short; segments 5, lorate, obtuse, green and with the same indumentum in the apical half as the bracts, brownish and glabrous below. *Corolla* ventricose with a very short narrowly cylindrical base, .6 in. long, blue, sparsely hairy, with gland-tipped hairs without, glabrous within except for a brush of white hairs behind the anthers and a few hairs at the insertion of the stamens. *Disc* annular. *Stamens* 4, in pairs. *Style* slender, as long as the corolla, apex recurved, undivided. *Ovary* oblong, glabrous; ovules 4.

GARO HILLS (Emangiri 2,000 ft.) (Mrs. N. E. Parry 1076)

S. glutinosus Nees is also recorded from the region of the Flora.

Flrs. 11.

■

5. *ERANTHEMUM* Linn. (*Dædalacanthus*).

Shrubs, undershrubs or perennial herbs. *Leaves* opposite, entire or obscurely crenulate, lanceolate. *Flowers* in spikes, heads or corymbs; bracts usually large and conspicuous; bracteoles narrow, small. *Calyx* 5-fid; lobes narrow, often scarious. *Corolla* tube long, slender, widened near the mouth or sometimes at the middle; lobes obovate, twisted to the left. *Stamens* 2, perfect, glabrous, 2 staminodes or 0; anthers oblong, 2-celled, exerted or subincluded. *Ovary* glabrous, 2 ovules in each style; style long and slender, glabrous, sparsely pubescent; stigma sessile. *Capsule* clavate with solid base. *Seeds* 4, compressed, discoid on sharp retinacula, hairy when wetted.

Corolla tube slender, cylindric:—

Anthers exerted:—

Petiole up to 2 in. Peduncles up to 3 in. 1. *E. nervosum*.

Petiole up to .3 in. long. Peduncles upto

4 in.

.. 2. *E. macrophyllus*.

E. strictum Coleber=D. strictus T. Anders. A small pubescent herb with basal leaves, blue flowers and large bracts is also recorded from KHASI HILLS.

Anthers included:—

- | | | | |
|--|----|----|---------------------------|
| Petiole up to 1 in. Bracts obovate-narrowed, not ciliate. Leaves elliptic. | .. | 3. | <i>E. suffruticosus</i> . |
| Petiole up to 2 in. Bracts ovate-lanceolate, ciliate. Leaves ovate. | .. | 4. | <i>E. purpurascens</i> . |

1. Eranthemum nervosum R. *Br.*=Dædalacanthus nervosus *T. Anders.* Vern. *Samscrew, Jagan-suh*, Mik.

A shrub or an undershrub up to 6 ft. high; branches puberulous. *Leaves* 3-7 by 1-2·5 in., elliptic or ovate, acuminate, usually entire or obscurely crenate, thinly chartaceous, dark green, cystoliths imbedded; lateral nerves 8-12 on either half, arcuate near the margin, sub-parallel; base cuneate or tapering; petiole ·5-2 in. long. *Flowers* bright blue, ·75 in. in dense bracteate spikes collected in large terminal panicles. *Peduncles* up to 3 in., puberulous; bracts conspicuous, white with green nerves, elliptic or obovate-oblong, ·6 in. long, cuspidate or abruptly short-acuminate; bracteoles linear-membranous. *Calyx* about ·25 in. long, directed half way down, minutely pubescent. *Corolla* up to 1·5 in. long; tube narrow, cylindric, widened at the mouth; lobes subequal. *Capsule* ·5 in. long, oblong, glabrous.

SIBSAGAR, DARRANG, KAMRUP. GARO HILLS, KHASI HILLS (upto 3,000 ft.).

Flrs. 1-3. Fr. Rainy season.

2. Eranthemum macrophyllum Wall=Dædalacanthus macrophyllus *T. Anders.*

A shrub closely allied to *D. nervosus* *T. Anders.* *Leaves* 3-7 by 1·5-2 in., elliptic-acuminate, subentire or obscurely crenulate, thin, scaberulous on the nerves beneath; base tapering; petiole 0·2 in. long. *Inflorescence* lax. *Peduncles* up to 5 in. long.

GOALPARA (Mann No. 10).

There is also a fragmentary specimen in the herbarium collected in Goalpara by W. Fisher in 1879 marked *D. scaber*.

Flrs. 4.

3. Eranthemum suffruticosum Roxb. = *Dædalacanthus suffruticosus* T. Anderss.

A small undershrub about 2 ft. high. *Branchlets* obscure, 4-angled, rusty pubescent. *Leaves* 1·5-5 by ·5-2·5 in., elliptic-acute or acuminate, entire, undulate or very obscurely crenulate, membranous, dark green above, paler beneath, scaberulous; lateral nerves 5-7 on either half; base cuneate; petiole ·3-1 in. long. *Flowers* purple with a white centre, usually very few in terminal spikes; bracts nervose, bluntly acute, ·8 by 1·2 in. (not ciliate). *Calyx* dilated half way down; lobes linear-lanceolate. *Corolla* tube slender, 1·75 in. long, glabrous, mouth widened, ·8 in. across. *Anthers* included.

SYLHET.

Flrs. 11.

4. Eranthemum pulchellum Andrew. Var. *purpurascens* O. Ktze. = *Dædalacanthus purpurascens* T. Anders.

An undershrub 2-3 ft. high; branchlets quadrangular, puberulous. *Leaves* 3-6 by 1·5-3·5 in., ovate, broadly elliptic, obtuse or acute, rarely acuminate, subentire or oblong-acute, thin, densely lineolate; lateral nerves 6-9 on either half; base decurrent on the petiole up to 2 in. long. *Flowers* purplish in axillary or terminal spikes often ternate; peduncles long, 1·5-3 in. long. *Spikes* up to 5·5 in. long; bracts veined, ovate-lanceolate, acuminate, ciliate. *Calyx* ·25 in. *Corolla* tube finely pubescent, 1·3 in. long, mouth ·6 in. across. *Anthers* subinculded. *Capsule* ·5·7 in., glabrous.

CACHAR, UPPER ASSAM.

Flrs. 12.

Eranthemum ciliatum (Craib) R. Ben.

Flowers bluish-mauve.

NAGA HILLS 750 M. (Bor. 2939).

Flrs. 3.

6. ACANTHUS Linn.

Acanthus leucostachyus Wall.

A shrub, decumbent stem woolly. *Leaves* 3-7 by 1-2·5 in., elliptic or oblong, obtuse or acute, spinous-serrate, subcoriaceous, glabrous above, pubescent along the nerves beneath also whitened; lateral nerves 7-13 on either half, nerves conspicuously reticulate; base cuneate; petiole ·3-·6 in. long. *Flowers* usually in terminal hairy spikes; bracts ·5-·9 in., linear-elliptic, hairy on both surfaces, spinous-toothed. *Calyx* hairy, 2 outer larger than the 2 inner, hairy, ciliate. *Corolla* white or purplish; tube short. *Anther* 1-celled, bearded. *Disc* obsolete. *Capsule* ellipsoid, compressed, ·4-·6 in., glabrous, shining, 4-seeded. *Seeds* compressed, glabrous.

KHASI HILLS.

Flrs. 3. Fr. Rainy season.

7. ANDROGRAPHIS Wall.

Andrographis paniculata Nees. Vern. *Kalmegh*, Beng.; *Kiruta*, *Bhunimba*, Sans.

An erect herb; stem quadrangular; young parts glandular-hairy. *Leaves* 1·5-2·5 by ·5-·8 in., subsessile, lanceolate or linear-lanceolate. *Calyx* segments equal, linear, glandular, narrow. *Corolla* white or purplish, spotted, 2-lipped, usually pubescent. *Stamens* 2; filaments ciliate; anthers exserted; cells bearded at the base. *Ovary* hairy, 3-9 ovules in each cell. *Capsule* glandular hairy when young, glabrous on maturity.

Plains of ASSAM.

The bitter shrub is well-known under the name of *Kalmegh*. The whole plant is bitter and the medicinal properties of the plant are many. It is officinal in the British Pharmacopœia (febrifuge, stomachic, tonic, alterative and anthelmintic and also for liver complaints).

Flrs. & Fr. 8-5.

8. GYMNOSTACHYUM Nees.

Gymnostachyum venustum T. Anders. Vern. *Jakhi*, Khasi.

A semi-herbaceous perennial 5-6 ft. high. *Leaves* 5-9 by 1·5-3 in., elliptic-ovate, obovate, entire, undulate or crenulate, membranous, scaberulous above, plain and pubescent, specially on the nerves beneath; base decurrent on the petiole, 4 in. long. *Cymes* in pubescent panicles, usually very large, sometimes very reduced. *Calyx* 5-fid; segments linear-lanceolate. *Corolla* limb purple, bluish, 1·1-25 in. long. *Stamens* 2, as long as the corolla; filaments hairy at the base; anthers 2-celled. *Ovary* pubescent; ovules many. *Capsule* linear, about ·8 in. long, many seeded. *Seeds* ovoid, compressed, hairy when wetted.

K. & J. HILLS (upto 4,000 ft.).

Flrs. 10. Fr. Cold season.

9. PHLOGACANTHUS Nees.

Shrubs or tall herbs. *Leaves* entire or obscurely crenate. *Flowers* showy, orange red or pink in terminal thyrsoid narrow panicles, rarely in axillary racemes or cymes; bracts small. *Calyx* deeply 5-fid; segments narrow. *Corolla* tubular, curved; tube oblique, 2-lipped; lobes connivent, patent or recurved, imbricate in bud. *Stamens* 2, sometimes with 2 small staminodes; anthers 2-celled, oblong, muticous, glabrous. *Ovary* 2-celled; ovules 5-8 in each cell; style filiform; stigma subsimple. *Capsule* elongate, sub-4-angled, seed bearing from the base. *Seeds* lenticular, ovate in outline, glabrous or densely shortly hairy.

Inflorescence dense terminal thyrsus:—

Leaves glabrous or almost so:—

- | | | |
|---|----|--------------------------|
| Petiole up to 3 in. Inflorescence upto 8 in., shortly peduncled. Corolla 2·5 in., light rosy. | 1. | <i>P. curviflorus</i> . |
| Petiole upto 1·8 in. Inflorescence 4 in., shortly peduncled. Corolla ·7 in. long, red. | 2. | <i>P. Wallichii</i> . |
| Petiole up to 1·5 in. long. Inflorescence upto 6 in. long. Corolla ·8 in., yellow. | 3. | <i>P. guttatus</i> . |
| Petiole upto 2 in. long. Inflorescence upto 12 in. long. Corolla ·8 in. long, orange. | 4. | <i>P. thyrsoflorus</i> . |

- Leaves pubescent. Petiole upto 3·3 in.
 Inflorescence upto 11 in. Corolla 1 in. .. 5. *P. tubiflorus*.
 Leaves hairy or punctate; petiole upto 1 in.
 Inflorescence about 4 in. Corolla ·5 in. .. 6. *P. asperulus*.
 Inflorescence short axillary panicles or cymes:—
 Leaves pubescent beneath specially on the
 nerves; petiole upto 8 in. Cymes almost
 glabrous; anthers far exserted. 7. *P. pubinervius*.
 Leaves glabrous; petiole upto 1·5 in. Panicle
 pubescent. Anther sub-included, shortly
 exserted. 8. *P. Jenkinsii*.

1. *Phlogacanthus curviflorus* Nees. Vern. *Mogang-sudi*, Kach.; *Kona-oing*, Miri; *Dhapa-tita*, Ass.; *Vatteju*, Lush.; *Kham-chhit*, Garo; *Tew-phot-saw*, Khasi.

A shrub 10-20 ft. long. *Leaves* 4-16 by 1·5-5·5 in., ovate or elliptic (often unequal sided and oblique) acute or acuminate, entire, undulate or cuneate, rather membranous, glabrate when mature (pubescent beneath when young); lateral nerves 8-10 on either half, subparallel; base cuneate or narrowed into the petiole, ·5-3 in. long. *Inflorescence* 6-8 in. long, densely pubescent. *Calyx* teeth linear, ·3-·4 in. long. *Corolla* light rose or pink, 2-2·5 in. long. *Capsule* 1·2-1·5 in. long. *Seeds* many, compressed, lenticular, glabrous.

N. E. F. TRACT, LAKHIMPUR, NOWGONG, DARRANG. CACHAR, SYLHET, LUSHAI HILLS, GARO HILLS, KHASI HILLS (upto 4,000 ft.).

Flrs. 10-11. Fr. 11-3.

2. *Phlogacanthus Wallichii* Clarke.

A shrub 8 ft. high. *Bark* green. *Leaves* 9-12 by 3-4·5 in., elliptic-acuminate, entire or obscurely undulate, thinly chartaceous, glabrous; lateral nerves 7-9 on either half; base cuneate or narrowed into the petiole ·8-1·8 in. long. *Inflorescence* pubescent, 2-4 in. long. *Calyx* pubescent; teeth triangular, lanceolate. *Corolla* ·7 in., red, pubescent. *Capsule* not seen.

KHASI HILLS, upto 3,000 ft.

Flrs. 10. Fr. Cold season (?).

3. *Phlogacanthus guttatus* Nees.

An undershrub almost glabrous. *Leaves* 5-9 by 2-3 in., elliptic (broadly elliptic), elliptic-lanceolate, acuminate, entire or subentire, subcoriaceous, glabrous; lateral nerves 8-11, arcuate, slender, conspicuous; base cuneate or narrowed into the petiole about 1.5 in. long. *Panicle* terminal or subterminal, sparsely pubescent. *Flowers* greenish white, spotted. *Calyx*-segments pubescent, linear-lanceolate, .15 in. long. *Corolla* bilabiate, about .5 in. long, pubescent. *Capsule* 1.25 by .5 in., 12-seeded (Hooker).

KHASI HILLS (2-4.000 ft.) (Mawsmat).

Flrs. 11.

4. *Phlogacanthus thyrsiflorus* Nees. Vern. *Ellor*, Garo; *Banheka*, *Ram-bahonka*, *Ronga-bahoka*, *Titaphul*, *Titabahak*, Ass.; *Baskabomphang*, *Barsiku*, *Jathang-heh*, *Dieng-soh-ja-buid*, *Soh-ja-jut*, *Dieng-soh-kajut*, *Ja-boit*, Khasi; *Rambha arong*, *Jaogan*, *Jakan*, Mik.

An evergreen shrub 8 ft. high. *Bark* yellowish-brown, striate. *Branchlets* quadrangular. *Leaves* 6-14 by 1.5-4 in., oblanceolate, elliptic-oblong, acute or acuminate, entire, chartaceous, closely punctate, dark glossy green above, pale beneath; lateral nerves 10-12 on either half, arcuate; base tapering into the petiole .5-3 in. long. *Inflorescence* 10-12 in. long, pubescent. *Bract* pubescent, .5-.7 in. long, linear, apiculate, caducous. *Calyx* pubescent, .4 in. long. *Corolla* .5-.8 in., orange (sometimes yellow as a freak, U. Kanjilal). *Capsule* up to 1.5 in. long, dilated at top. *Seeds* 12-14.

Common throughout the province (upto 4.000 ft.).

Flowers are eaten cooked as vegetable. Fruit and the leaves are taken by the Mikirs after burning them as a specific for fever. In the Punjab, it is put to the same uses as *Adhatoda vasica* Nees (I.M.P.).

Flrs. 12-2. Fr. 2-4.

5. *Phlogacanthus tubiflorus* Nees. Vern. *Banchok*, *Banchha*, Mik.; *Battejup*, Tipp.: *Bhataitita*, Ass.

A shrub 6-8 ft. high. *Leaves* 4-11 by 2.5-5 in., elliptic, ovate-acuminate, entire, subentire or obscurely crenulate,

thinly chartaceous, densely granulate above, pubescent specially on the nerves beneath; lateral nerves 8-10; base cuneate or tapering into a petiole .5-3.3 in. long. *Inflorescence* dense or lax up to 11 in. long, somewhat hairy. *Calyx* glabrate or pubescent; segment triangular, lanceolate, .15 in. long. *Corolla* 1 in., red, curved, gradually slightly widened at the mouth. *Capsule* 1-1.3 in., glabrous. *Seeds* compressed, glabrous, blackish brown.

SIBSAGAR, NOWGONG, SYLHET, GARO HILLS, KHASI HILLS (upto 3,000 ft.).

Flowers are eaten cooked as vegetables. Used for washing by rubbing the leaves which gives a lather with water.

Flrs. 12-1. Fr. 1-3.

6. *Phlogacanthus asperulus* Nees.

A shrub, glabrous. *Leaves* 2-8 by .8-2.5 in., elliptic, broad-elliptic or acuminate, entire or undulate, subcoriaceous, glabrous, punctuate beneath; lateral nerves 7-9 on either half, arcuate; base cuneate or narrowed into the petiole .3-1 in. long. *Inflorescence* 3-4 in., sparsely pubescent. *Calyx* pubescent; teeth linear, apiculate. *Corolla* about .5 in., pubescent, pinkish, curved and widened at the mouth. *Capsule* .6 in., glabrous.

LAKHIMPUR, KHASI HILLS (upto 5,000 ft.)

Flrs. 3. Fr. 5.

7. *Phlogacanthus pubinervius* T. Anders.

A large shrub (20'/18"). *Bark* light chocolate brown or greyish and softly corky outside with fine ventral fissures exfoliating in thin flakes, .12-.2 in. thick; inside very softly fibrous, light dun brown. *Leaves* 2-6 by .5-2.5 in., elliptic, acute or acuminate, entire, membranous, punctate above, obscurely pubescent on the nerves beneath; lateral nerves 7-8 on either half, oblique; base tapering into the petiole .5-1 in. *Cymes* numerous, sub-sessile (sometimes flowers solitary); pedicels often .3 in. long. *Calyx* punctate; teeth .3 in. long, linear-oblong, lanceolate, woolly at the margin. *Corolla* .7 in. long, yellow with brown veins, tubular,

curved, widened at the mouth, 5-lobed, puberulous. *Anthers* far-exserted.

K. & J. HILLS (upto 5,000 ft.).

Flrs. 11-3. Fr. Hot season.

8. *Phlogacanthus Jenkinsii* Clarke.

Branches stout, quadrangular. *Leaves* 6.5 by 2.25 in., elliptic-acute, subentire; petiole 1.5 in. *Inflorescence* grey pubescent. *Calyx* segments linear-lanceolate, .25 in., grey pubescent. *Corolla* puberulous. *Stamens* 2, glabrous; anthers short, exserted. *Ovary* glabrous, 12-ovulate; style glabrous.

No specimens in Forest Herbarium, Shillong, F.B.I., Vol. IV. P. 513.

10. BARLERIA Linn.

Shrubs or herbs, sometimes spinescent. *Leaves* opposite, entire. *Flowers* showy, sessile, solitary or in spikes. *Calyx* deeply 4-partite in decussate pairs, outer pair much the larger. *Corolla* funnel-shaped; tube elongate; lobes 5, subequal, imbricate in bud. *Stamens* 2, fertile, rudimentary and often a rudimentary 5th. *Anthers* oblong, 2-celled. *Disc* large, often cupular and toothed. *Ovary* with 2 ovules in each cell; style long, shortly bifid or subentire. *Capsule* ovoid or oblong. 2-4-seeded. *Seeds* compound with closely adpressed silky hairs.

Unarmed:—

Spikes few flowered, not unilateral. Outer calyx-segments pectinately toothed. Flowers usually white or rose coloured.	1. <i>B. cristata</i> .
Spikes unilateral. Outer calyx-segments obscurely serrulate. Flowers blue.	2. <i>B. strigosa</i> .

1. *Barleria cristata* Linn.

A small undershrub. *Branches* adpressed pubescent. *Leaves* variable, 2.5 by .8-1.5 in., oblong or elliptic-oblong, acute or acuminate, membranous, lanceolate above, pubescent on both surfaces, specially along the nerves beneath, paler beneath; base acute; petiole .1-.3 in. long. *Flowers* rose coloured, purplish blue or about 1 in. across, solitary

or paired or in short spikes; bracteoles up to .5 in. long, pubescent, linear, linear-lanceolate, mucronate, acute. *Calyx*-segments .6-.8 in. long, prominently reticulate, pectinately bristle-toothed; inner segments lanceolate, about .3 in. long. *Corolla* 1-2 in. long, pubescent outside; lobes obovate-oblong, equalling the tube. *Stamens* 2. *Capsule* about .6 in., ellipsoid, tapering at 4 ends, 4-seeded.

NOWGONG, KHASI HILLS.

The seeds are supposed to be an antidote for snake-bite and the roots and leaves are used to reduce swelling and an infusion is given in coughs (Watt).

Flrs. 9-11. Fr. Cold season.

2. *Barleria strigosa* Willd.

A small undershrub 2-4 ft. high. *Branches* brown, strigose. *Leaves* 3-8 by 1.5-4 in., ovate-elliptic, acuminate, membranous, usually lineolate and sparingly pubescent along the nerves above, strigose specially along the nerves beneath; lateral nerves 5-6 on either half, somewhat remote; base long, decurrent on the petiole 0.2 in. long. *Flowers* blue, unilateral on hairy spikes 1-3 in. long; bracteoles oblong or ovate-elliptic, ciliate. *Outer-sepals* about 1 in., obscurely mucronate beneath. *Corolla* 1 in. across, 1.5-2 in. long; lobes obovate. *Capsule* .6-.75 in., glabrous, apiculate, 4-seeded.

Plains of ASSAM (not very common).

The root is used by Santals as a remedy for cough (I.M.P.).

Flrs. 9-12. Fr. Cold season.

11. MACKAYA Harv. (*Asystasia* Blume).

Herbs or undershrubs. *Leaves* entire, lineolate. *Flowers* moderate sized in lax or dense usually 1-seeded simple or compound spikes or racemes; bracts and bracteoles linear, usually shorter than the calyx, 5-partite; segments linear and lanceolate. *Corolla* tube cylindric below, funnel-shaped or ventricose above; lobes 5, subequal, imbricate in bud. *Stamens* 4, perfect, didynamous; anther cells parallel, approximate, minutely spurred or with the bases only obscurely

whitened. *Ovary* 2-celled, 2 ovules in each cell; style linear; stigma 2 fid or subcapitate. *Capsule* elliptic; base contracted, solid. *Seeds* compressed, orbicular, angular, rugose, tubular or glabrous.

Corolla ventricose upwards about 1·25 in. long.

Leaves 1-4 by ·5-1·2 in., petiole upto ·1-·3 in. 1. *M. macrocarpa*.

Corolla funnel-shaped upwards, 2·2-2 in. long.

Leaves 4-9 by 2-4 in., petiole ·5-2 in. long. .. 2. *M. Neesiana*.

1. *Mackaya macrocarpa* Nees.

A rambling undershrub; young parts pubescent. *Leaves* 1-4 by ·5-1·2 in., narrow, oblong or elliptic, lanceolate, acuminate, entire, membranous, pubescent; lateral nerves about 5-8, obscure on either half; base narrowed into the petiole ·1-·3 in. long. *Flowers* purplish in 1-sided rather lax racemes. *Calyx* pubescent, ·25 in. long. *Corolla* 1-1·25 in. long, pubescent. *Anther* cells distinctly spurred at the base. *Capsule* 1·3 in. long, pubescent.

GOALPARA.

Flrs. 2. Fr. Hot season.

2. *Mackaya Neesiana* Nees. Vern. *Obul-oing*, Abor.

A small shrub. *Leaves* 4-9 by 2-4 in., elliptic or ovate-elliptic, acute or acuminate, membranous, densely lineolate on both surfaces, glabrous above, pubescent on the nerves beneath; lateral nerves 10-15 on either half; base narrowed into the petiole, ·5-2 in. long, uppermost pair of leaves almost sessile with a subcordate base. *Flowers* in very elongate lax pubescent racemes (up to 18 in. long). *Calyx* pubescent, ·3 in. long; segments linear. *Corolla* 2·2-2 in. long. *Anther* cells obscurely mucronate. *Capsule* ·1-1·5 in. long. *Seeds* compressed, glabrous, tubercled.

K. & J. HILLS, N. E. F. TRACT, CACHAR (Keenan).

Leaves are used as vegetables.

Flrs. 3-9. Fr. Cold season.

M. atroviridis *T. Anders.*

Undershrub; stem up to 10 ft. high. *Leaves* 2-5 by .6-2 in., elliptic, acuminate, membranous, glabrous; lateral nerves 8-12 on either half, distinct; base narrowed into the petiole; petiole about .5 in. long. *Flowers* in condensed racemes, about 2 in. long. *Calyx* narrow, pubescent at least at the margin of the segments. *Corolla* rosy, funnel-shaped upwards. *Stamens* 4, glabrous; capsule elliptic, about 1.3 in. long.

KHASI HILLS (upto 3,000 ft.).

Flrs. & Fr. Cold season.

12. PSEUDERANTHEMUM Radlkf.

Shrubs or undershrubs. *Leaves* usually entire, sometimes undulate or crenulate. *Flowers* subserrate, 1-3 in the axils of opposite bracts or in terminal dense or interrupted simple or branched spikes or pedicelled, ternate at the tip of axillary peduncle; bracts and bracteoles small and narrow. *Calyx* 5-fid or partite; segments short, narrow, subequal. *Corolla* tube long, narrow, cylindric, rarely widened at the throat; lobes 5, spreading, subequal. *Stamens* 2, perfect, usually 2 staminodes; anthers ovate or oblong, 2-celled; cells oblong, equal, parallel, connective widened. *Disc* annular or shortly cupular. *Ovary* 2-celled, usually glabrous; style filiform; stigma entire or shortly 2-lobed. *Capsule* oblong, contracted below in a long stipe. *Seeds* compressed, orbicular or subquadrate, smooth or rugose, supported on an acute retinacula.

Corolla tube ventricose distinctly 2-lipped:—

Corolla white, light purple veined. *Leaves* glabrous.

1. *P. indicum.*

Corolla tube cylindric, narrow, obscurely 2-lipped:—

Corolla purple:—

Leaves glabrous, obscurely crenulate. *Capsule* glabrous.

2. *P. crenulatum.*

Leaves pubescent, entire; *Capsule* pubescent.

3. *P. palatiferum.*

1. Pseuderanthemum indicum *A. M. & J. M. Cowan.* Vern. *Diengjathang*, Khasi.

An undershrub up to 15 ft. in height; stem and branches grey to cinnamon coloured; blaze green.

Leaves 2-6 by .6-2 in., lanceolate or elliptic-lanceolate, acuminate, entire, membranous, glabrous; lateral nerves 4-7 on either half; base narrowed into the petiole, .3-1 in. long. *Flowers* white, with purple veins in sparsely pubescent racemes. *Calyx* segments linear-lanceolate. *Corolla* 1.4 in. long, ventricose, distinctly 2-lipped; filaments hairy. *Capsule* 1.1-1.5 in. long, glabrous. *Seeds* orbicular, tubercled, finely pubescent.

K. & J. HILLS (upto 4,000 ft.).

Flrs. 2-3. Fr. 4.

2. *Pseuderanthemum crenulatum* Radlk.

An undershrub, glabrous. *Leaves* 4-6 by 1.8-2 in., elliptic or lanceolate, acuminate, obscurely crenulate, membranous, glabrous; lateral nerves 5-8 on either half; base cuneate or acute; petiole .3-.5 in. long. *Flowers* purplish in terminal lax simple or compound racemes, which often curved and up to 5 in. long; bracts linear. *Calyx* puberulous; segments linear-lanceolate, .2 in. long. *Corolla* 1.4 in. long, oblong, 2-lipped; tube linear, cylindric.

KHASI HILLS.

No specimen in the Forest Herbarium, Shillong.

3. *Pseuderanthemum palatiferum* (Nees) Radlk.

An undershrub 6-8 ft. high; young parts pubescent. *Leaves* unequal-sided, often oblique, 3.5-9 by 1-3 in., elliptic, acuminate, entire, chartaceous, densely lineolate above, sparsely pubescent on the nerves beneath. *Flowers* often clustered in compound paniced spikes. *Calyx* segments linear-pubescent. *Corolla* purplish, 1.3 in. long, oblong, 2-lipped; tube linear-cylindric. *Capsule* about 1 in. *Seed* glabrous.

LAKHIMPUR. KHASI HILLS (upto 3,000 ft.).

Flrs. 2. Fr. 3-4.

Var. levicapsa; leaves more conspicuously lineolate on the upper surface; flowers often slenderer.

LAKHIMPUR. KHASI HILLS.

Flrs. 2.

P. leptanthus (Clarke) Lindan.—Is a large herb recorded from Mishmi Hills (Griffith).

13. CODONACANTHUS Nees.

Codonacanthus pauciflorus Nees.

An erect herb. *Leaves* 2-4 by 1-2 in., elliptic-acuminate, entire, scaberulous above, pubescent on the nerves beneath; lateral nerves slender; base acute or cuneate; petiole 2-6 in. long. *Flowers* in long paniculate lax, slender, pubescent racemes. *Calyx* segments triangular, lanceolate, glabrous. *Corolla* pinkish or whitish, glabrous, ventricose, nearly from the base; lobes subequal. *Stamens* 2 perfect, 2 rudimentary. *Capsule* 5 in., 4-seeded.

DARRANG, KHASI HILLS.

Flrs. 3. Fr. Rainy season.

14. LEPIDAGATHIS Willd.

Herbs or undershrubs. *Leaves* entire or crenate-serrate. *Flowers* sessile (or fascicled spikes), axillary or terminal, usually 1-seeded heads, sometimes opposite and solitary; bracts usually conspicuous; bracteoles smaller. *Calyx* deeply 5-fid; segments unequal, the 2 anterior more or less connate. *Corolla* tubular, suddenly ventricose above the middle, bilabiate, the upper lip erect, 2-fid, lower spreading, 3-lobed, usually spotted. *Stamens* 4, didynamous; anthers 2-celled, cells oblong, parallel, somewhat one above the other. *Ovary* 2-celled; ovules 2 or 1 in each cell. *Stigma* capitellate, minutely 2-fid or entire. *Capsule* elongate, compressed, conoid or oblong. *Seeds* 2-4, compressed, hairy.

Capsule 4-seeded:—

Leaves entire, linear-lanceolate. Corolla yellowish white, with tomentose marks. ..	1.	<i>L. rigida</i> .
Leaves caudate-ovate or oblong. Corolla white with brown spots.	2.	<i>L. incurva</i> .

1. **Lepidagathis rigida** Dalz.

A rigid gregarious undershrub. *Stem* quadrangular. *Leaves* 2-6 by 1-6 in., linear-lanceolate, acute or acuminate,

coriaceous, glandular pubescent; spikes glandular hairy. *Calyx* glandular pubescent. *Capsule* .3-.4 in. long. *Seed* 4.

GOALPARA.

Flrs. 11-12. Fr. 1-2.

2. *Lepidagathis incurva* D. Don.=*L. hyalina* Nees.
Var. *aristata* Fischer. Vern *Byiradimat-mengo-kime*, Garo.

Stem wing upto 10.1 in. long. *Leaves* 6 by .5 in., narrowly elliptic, acute or obtuse, glabrous, shining, dark green above, pale below; lateral nerves 7-9 on either half; base decurrent into the short petiole. *Spikes* dense; bracts and bracteoles aristate, brown or green, about .4 in. long. *Corolla* white, spotted with brown.

Baghmara (GARO HILLS) upto 2,000 ft.

Flrs. 11.

15. PHIALACANTHUS Benth.

***Phialacanthus Griffithii* Benth.**

An erect glabrous shrub. *Leaves* 7.5 by 2.5 in., entire, broad, elliptic-acuminate; bearing raphides on both surfaces; base acuminate; petiole 1.5 in. long. *Cymes* 3 in. across, terminal; peduncles short; pedicels slender, .25 in. long; bracts minute. *Calyx* coloured, tubular, campanulate, membranous, enlarged in fruit; teeth minute, triangular. *Corolla* 1.75 in. long, orange with yellow mouth, ventricose upwards, limb 2-lipped; lobes 5, subequal, imbricate in bud. *Stamens* 4, glabrous; anthers pubescent. *Style* filiform, glabrous; stigma minutely 2-lobed; ovules 2 in each cell. *Capsule* .25 in., glabrous, shortly stalked, oblong, 4-seeded.

MISHMI HILLS (ASSAM) Griffith. No specimen in Forest Herbarium, Shillong, F.B.I., Vol. IV. P. 523.

16. DICLIPTERA Juss.

***Dicliptera Roxburghiana* Nees.**

A diffuse herb from a woody root-stock 6-18 in. high, puberulous. *Leaves* 1.5-4 by .6-1.5 in., elliptic, rhomboid, lanceolate-acuminate or acute, membranous, glabrate or

puberulous above, thinly pubescent beneath; base cuneate; petiole .05-1.2 in. long. *Flowers* pinkish, in axillary peduncled bracteate cymes. *Bracts* and calyx glandular pubescent. *Capsule* .2-.25 in.

N. E. F. TRACT, GARO HILLS, SYLHET ?

It is said to be a useful tonic (Watt). The plant is used medicinally in the Punjab (Stewart).

Flrs. 12-1. Fr. 2-3.

17. JUSTICIA Linn.

Shrubs, undershrubs or herbs. *Leaves* entire, usually lanceolate. *Flowers* sessile or subsessile, in spikes or panicles (rarely solitary); bracts conspicuous; bracteoles small or 0. *Calyx* 5- or 4- partite; segments narrow. *Corolla* 2-lipped; teeth equalling or shorter than the limb; upper lip 2-lobed or subentire, lower 3-lobed; lobes imbricate in bud. *Stamens* 2; filaments often dilated, hairy near the base; anthers 2-celled; cells oblong or rounded, more or less discrete, lower with white basal appendage. *Ovary* 2-celled, 2 ovules in each cell; style filiform; stigma 2-fid. *Capsule* ovoid or obovoid, 4-seeded, either from the base or 4-seeded at the apex with a long seedless base. *Seeds* ovoid, more or less compressed, tubercular, scaly or echinate, not hygroscopically hairy.

Flowers in axillary clusters:—

Bracts obovate or spathulate:—

- | | | |
|--|-------|---------------------------|
| Leaves elliptic acute, puberulous; bracts rusty pubescent; petiole 3 in. long. | .. | 1. <i>J. quadrifaria.</i> |
| Leaves lanceolate-acuminate; bracts glabrate or sparsely pubescent; petiole .05-.1 in. long. | .. .. | 2. <i>J. salicifolia.</i> |
| Leaves linear-lanceolate, glabrous; petiole hardly any. | .. .. | 3. <i>J. Neesiana.</i> |

Flowers in terminal spikes:—

Bracts linear:—

- | | | |
|------------------------------|-------|--------------------------|
| Leaves lanceolate, glabrous. | | 4. <i>J. Gendarussa.</i> |
|------------------------------|-------|--------------------------|

Bracts oblong or linear:—

- | | | |
|--|-------|-------------------------|
| Leaves ovate, pubescent on the midrib beneath. | | 5. <i>J. vasculosa.</i> |
|--|-------|-------------------------|

Flowers laxly paniced:—

Seeds echinate:—

Bracts small, linear or linear-lanceolate:—

Leaves sessile:—

Stem elongate, hispid. 6. *J. khasiana*.

Stem prostrate. 7. *J. assamica*.

Leaves petioled:—

Bracts elliptic, subacute, broad, clothed with glistening jointed hairs, ovate or oblong. 8. *J. simplex*.

Bracts linear-lanceolate, hairy about half as broad as above, elliptic or lanceolate. 9. *J. procumbens*.

1. *Justicia quadrifaria* Wall.

Branches rusty pubescent. *Leaves* 3·5 by 1·5 in., elliptic, acute at both ends, pubescent on the nerves beneath; petiole ·3 in. long. *Flowers* in dense axillary clusters. *Branchlets* orbicular or emarginate, rusty pubescent. *Calyx* sub-5-partite; segments lanceolate, puberulous. *Corolla* small, hairy, white, rose-spotted; lower anther cell white lobed. *Capsule* ·25 in., 4-seeded, minutely pubescent. *Seeds* tubercular, verrucose, glabrous.

ASSAM (Griffith), K. & J. Hills (3,000 ft.), Wall. No specimen in Forest Herbarium, Shillong, F.B.I. Vol. IV. P. 530.

2. *Justicia salicifolia* T. Anders.

An undershrub, 1-2 ft. long. *Leaves* 1·5-5 by ·2-·8 in., lanceolate-acuminate, entire, membranous, sparsely pubescent above, glabrous beneath with numerous raphides. *Flowers* white, in axillary clusters; bracts suborbicular, glabrate. *Calyx* linear, 5-partite; segments linear. *Corolla* ·3-·5 in. long, almost glabrous. *Capsule* ·4 in. long.

KHASI HILLS, (upto 4000 ft.).

Flrs. & Fr. Cold season.

3. *Justicia Neesiana* Wall.

A small undershrub, internodes short. *Leaves* 1·5 by ·25 in., linear-lanceolate, glabrous, almost sessile. *Flowers* in close axillary clusters; bracts spatulate. *Corolla* ·25 in.

KHASI HILLS, (Wallich.).

No specimen in Forest Herbarium, Shillong, F.B.I. Vol. IV. P. 531.

4. *Justicia Gendarussa* Linn. Vern. *Titiria-soso-arong*, Mik.; *Tita-bahak*, *Bishalya-karani*, Ass.; *Dajagipe*, Garo.

An undershrub 2-5 ft. high. *Stem* green, smooth. *Leaves* 2-5 by $\cdot 2\text{--}1\cdot 4$ in., lanceolate, bluntly acuminate, undulate or crenulate, sub-coriaceous, pubescent when young, glabrous on maturity; lateral nerves slender, distant, 5-7 on either half; base acute or cuneate; petiole $\cdot 1\text{--}\cdot 5$ in. long. *Flowers* white with purple spot inside, in interrupted spikes often forming terminal panicles; bracts linear, about $\cdot 12$ in. long. *Calyx* about $\cdot 2$ in. long; segments linear. *Corolla* about $\cdot 5$ in. long. *Capsule* $\cdot 5$ in., glabrous.

LAKHIMPUR. SIBSAGAR, KAMRUP, K. & J. HILLS—upto 5,000 ft.

Flrs. 2-5.

5. *Justicia vasculosa* Wall.

Herbaceous, about 2 ft. high, with perennial root-stock. *Leaves* 3-7 by $1\cdot 5\text{--}3$ in., ovate-acuminate, entire, membranous, scaberulous above, pubescent on the midrib beneath; base alternate on the petiole $\cdot 5\text{--}1\cdot 8$ in. long. *Flowers* solitary, opposite in simple or paniculate spikes; bracts oblong. *Calyx* segments lanceolate. *Corolla* $\cdot 5\text{--}\cdot 6$ in. long, dull white with purple.

SIBSAGAR, KHASI HILLS.

Portion of leaves is used for inflammation.

Flrs. 10-12. Fr. 1-2.

6. *Justicia khasiana* Clarke.

Stem quadrangular, hispid, rather herbaceous. *Leaves* $1\cdot 1\text{--}1\cdot 5$ by $\cdot 2\text{--}\cdot 4$ in., elliptic-oblong or lanceolate, acute, membranous, hispid; base rounded; petiole slender, short, linear-oblong, hispid. *Spikes* hispid, scarcely interrupted. *Calyx* segments hispid. *Capsule* ellipsoid.

KHASI HILLS, (5000 ft.).

Flrs. 8.

7. *Justicia assamica* Clarke.

Stems 4-5-angled, glabrous. *Leaves* 1·5 by ·3 in., oblong, sessile. *Calyx* white, setulose. *Capsule* ellipsoid.

KHASI HILLS, (5000 ft.)—Griffith.

(No specimen in Forest Herbarium, Snillong. F.B.I. Vol. IV. P. 537).

8. *Justicia simplex* Don Prodr.

A slender herb 6-20 in. high. *Leaves* ·5-2 by ·2·8 in., ovate or elliptic-oblong, lanceolate; bracts elliptic, subacute, about ·08 in. broad, clothed with jointed glistening hairs.

LAKHIMPUR.

Flrs. 1.

9. *Justicia procumbens* Linn. Var. *latispica* Clarke.

A diffuse herb. *Leaves* variable, 1-5 by ·5-1·5 in., elliptic or lanceolate; bracts linear, hispid, lanceolate, hairy, about ·04 in., broad.

KHASI HILLS.

Flrs. 11.

18. ADHATODA Nees.

Adhatoda vasica Nees. Vern. *Bakas, Basak, Vasaka*, Beng.; *Bahaka*, Ass.

An evergreen gregarious shrub 4-8 ft. high with foetid smell. *Bark* smooth, pale brown; young parts pubescent. *Leaves* 2·5-8 by 1-3 in., elliptic or lanceolate, acuminate, entire or undulate, subcoriaceous, minute, pubescent; lateral nerves 8-12 on either half; base abruptly narrowed into the petiole ·5-1·5 in. long. *Flowers* white in dense, bracteate, peduncled spikes 4-6 in. long, axillary, solitary or terminal together at the ends of branches. *Bracts* conspicuous, ovate or obovate, often mucronate, ·7 by ·5 in.; bracteoles narrower. *Calyx* ·3-·5 in. long, deeply 5-fid; segments oblong-acuminate, pubescent on the margin and at the apex inside. *Corolla* 1-1·3 in. long; tube hairy outside with short basal portion, slightly dilated in the middle; the upper portion

thin, inflated; throat usually with 2 lines of purple or yellow leaves, upper lip curved, notched at the apex; lobes of lower lip rounded. *Stamens* 2; filaments hairy at the base only; anther-cells minutely pointed at the base. *Ovary* hairy; ovules 2 in each cell. *Capsule* .75 in. long, clavate, longitudinal, channelled, pubescent, 4-seeded. *Seed* .2 in. long, suborbicular, compressed, tubercled.

Common throughout the province.

The plant is considered very efficacious in preliminary diseases and possesses other medicinal properties. It has also undoubted antiseptic properties.

The plant is said to be good insecticide.

Flrs. 12-4. Fr. 2-5.

19. RHINACANTHUS Nees.

Rhinacanthus calcaratus Nees.

A shrub with stout branches. *Leaves* 3.5-8 by 1.2-3 in., elliptic-acuminate, entire, glabrous; lateral nerves 12-14 on either half, almost parallel, arcuate; base narrowed into the petiole .5-1 in. long. *Flowers* in terminal panicles. *Calyx* 5-partite, almost glabrous; segments linear-lanceolate. *Corolla* white, 2-lipped, about 2 in. long. *Stamens* 2, inserted near the top of the tube; anthers 2-celled; cells superposed. *Capsule* clavate, 4-seeded, basal portion long, solid.

KHASI HILLS, CACHAR, LAKHIMPUR (U. D. Resonus).

Flrs. 3.

20. ECBOLIUM Kurz.

Ecbolium Linneanum Kurz.

A small undershrub with a woody root-stock. *Leaves* 4.6-5 by 1.5-3 in., elliptic-lanceolate or oblanceolate, bluntly acuminate or acute, sinuate, glabrate with age, dark green above; lateral nerves 5-7 on either half; base tapering into a short petiole, .2-.7 in. long. *Flowers* bluish in dense terminal spikes. *Bracts* yellowish-green, .6-.75 in. long. *Calyx* 5-partite; segment broadly subulate. *Corolla* 2-lipped, hairy outside. *Stamens* 2, staminodes 0; anther-cells subequal, muticous. *Ovary* pubescent, 2-celled; ovules 2 in each cell.

Capsule upto 8 in. long, upper portion .5 by .3 in., broad-ovate, acute, abruptly narrowed to a solid stripe. *Seed* usually 1 in each cell.

NOWGONG.

The roots are prescribed in jaundice.

Flrs. & Fr. 11-4.

21. SPHINCTACANTHUS Benth.

Sphinctacanthus Griffithii Benth.

An erect glabrous shrub. *Leaves* 7.5 by 3.5 in., toothed or subentire, acute; base acute; petiole 1 in. *Flowers* opposite in interrupted spikes forming a panicle. *Calyx* .1 in., sub-5-partite; segments linear. *Corolla* tube ovoid, inflated, constricted at top; limb 2-lipped; upper emarginate, lower 3 lobed. *Stamens* 2; anthers 2-celled. *Ovary* 4-ovulate; style linear, minutely bifid. *Fruit* unknown.

MISHMI HILLS (ASSAM) Griffith.

No specimen in Forest Herbarium, Shillong, F.B.I. Vol. IV. P. 544.

The undermentioned plants are also recorded from the region of the flora :—

Hydrophila polysperma T. Ander.

An annual, procumbent, 6-18 in. long. *Leaves* .5-1 by .2-4 in., ovate or oblong, nearly entire, sparsely puberulous. *Flowers* in dense terminal spikes. *Calyx* 5-partite. *Corolla* slender, pubescent. *Stamens* 2, perfect. *Capsule* linear, .3 in. long, many seeded.

KAMRUP.

Flrs. 4. Fr. 11.

Rungia stolonifera Clarke.

A small undershrub, rather herbaceous, 1-2 ft. high. *Leaves* 1.2-5 by .5 in., ovate, scabrid; petiole .3-1 in., slender. *Flowers* bright lurid blue; lip of corolla marked with bright white veins. *Stamens* 2; anthers spurred; style filiform, glabrous. *Capsule* ovoid, glabrous. *Seeds* 4, compressed.

KHASI HILLS.

Flrs. 9.

R. khasiana T. Anders. *R. parviflora* Nees are also in record.

The root of *R. parviflora* is used as a specific by Santals and is also used in Bombay to adulterate fermentary (*I. M. P*)

***Peristrophe fera* Clarke.**

A herb rather woody. *Leaves* 2-4 by .6-1.3 in., ovate-lanceolate, acuminate, pubescent; *petiole* .5-1.2 in. long. *Flowers* purple with only one lanceolate lobe. *Stamens* 2; anther-cells one slightly above the other; filaments hairy. *Capsule* ellipsoid, 4-seeded.

KHASI HILLS.

Flrs. 11.

***P. bivalois* (L.) Merr.=*P. tinctoria* Nees.**

Leaves 1.2-5 by .5-.8 in., ovate, puberulous; *petiole* .1-.3 in. long. *Bracts* elliptic. *Corolla* 1.25 in., slender.

Cultivated.

FAM. 100. VERBENACEÆ.

Shrubs, trees or herbs, sometimes scandent, commonly fœtid or aromatic. *Leaves* opposite or whorled, usually simple, less often digitate, exstipulate. *Flowers* hermaphrodite or polygamous, zygomorphic, often showy, usually in variously formed inflorescence, less often racemose inflorescence, sometimes collected in heads. *Calyx* inferior, gamosepalous, persistent, usually 4-5- (rarely 6-8) partite or toothed, sometimes bilabiate, rarely truncate. *Corolla* 2-lipped or subequally 4-5 lobed, rarely more. *Stamens* 4, didynamous, less often equal, rarely 2, rarely more, inserted on the corolla tube; filaments free; anthers 2-celled. *Disk* inconspicuous. *Ovary* usually 2-4-celled, entire or lobed: style terminal; stigma usually bifid; ovules 1-2 in each cell. *Fruit* drupaceous with a 4-celled endocarp or 4 pyrenes (or fewer by abortion) or partially connate drupes, less often dry or capsular 4-or 2-valved. *Seeds* 1 in each cell, usually exalbuminous; embryo straight; radicle inferior.

Inflorescence with lowest flowers opening first, (centripetal) densely spicate:—

Pyrenes or drupe 2 or 1, 1-seeded. Flowers sessile; spike capitate:—

- Calyx truncate or densely toothed. Fruit succulent. 1. **Lantana.**
 Calyx 2-4-fid. Fruit dry; spike long, slender. 2. **Lippia.**
 Calyx long, tubular; spike terminal elongate, slender. 3. **Stachytarpheta.**

Inflorescence cymose with end flowers opening first (centrifugal):—

Cymes paniculate. Drupe fleshy:—

Flowers more or less regular:—

- Flowers 4-merous. Drupe with (1-4) pyrenes. Calyx less accrescent in fruit. 4. **Callicarpa.**
 Flowers 4-6-merous. Drupe with 4-celled endocarp. Calyx accrescent in fruit. .. 5. **Tectona.**

Flowers zygomorphic:—

Corolla 2-lipped. Stamens 4, didynamous:—

Leaves simple:—

- Flowers large. 6. **Gmelina.**
 Flowers small. 7. **Premna.**

- Leaves digitate. Drupe with 4 (-1) celled endocarp. 8. **Vitex.**

Leaves simple. Fruit with 4, 1-seeded pyrenes:—

- Corolla tube slender. Calyx campanulate. 9. **Clerodendron.**
 Corolla widened upwards. Calyx petaloid. 10. **Holmskioldia.**

- Cymes paniced. Fruit of 4 slightly winged pyrenes. Calyx deeply 4-6-fid. Leaves simple, shrub. 11. **Caryopteris.**

- Cymes capitate with an involucre of large bracts. Corolla 5-6 merous. Stamens included or shortly exerted, large. Climbers. .. 12. **Sphenodesma.**

1. LANTANA Linn.

Shrubs, erect or subscandent, pubescent, scabrous or prickly, often rambling, strongly aromatic; branches 4-angled. *Leaves* simple, opposite or truncate, crenate, often rugose. *Flowers* in pedunculate capitate, ovoid or cylindrical spikes; bracts persistent, exceeding the calyx; bracteoles 0. *Calyx* small, membranous, truncate or obscurely toothed. *Corolla* 4-5-lobed; tube slender; lobes spreading. *Stamens* 4, didynamous, included; anthers oblong. *Ovary* 2-celled; style short, stigma oblique, sub-capitate; ovules solitary in each cell. *Fruit* drupaceous with more or less fleshy mesocarp

containing 2 bony 1-seeded pyrenes. *Seeds* exalbuminous; radicle inferior.

Stems not prickly:—

Leaves sometimes ternate, sparingly scaberulous beneath; bracts-ovate or elliptic-ovate, 7-ribbed.

1. *L. indica*.

Stems with many recurved prickles:—

Leaves opposite, whitish tomentose beneath; bracts lanceolate, 3-5-ribbed.

2. *L. aculeata*.

1. *Lantana indica* Roxb.

An erect shrub 3-8 ft. high; branches pubescent, rambling. *Leaves* opposite, sometimes ternate, 1-3 by .75 in., ovate-acute, crenate, coriaceous, rugose and hairy with bulbous-based hairs above and usually whitish tomentose beneath; base rounded or cuneate; petiole up to .5 in. long. *Flowers* very faintly scented, pink or purplish with a yellowish tube; bracts ovate, 7-ribbed. *Fruit* purple when ripe, .15-.2 in. across, enclosed by the membranous calyx.

Plains of ASSAM.

Leaves are regarded as a cure for snake bite (Duthie).

Flrs. 4-5. Fr. 9-10.

2. *Lantana aculeata* Linn. Syn. *L. Camara* Linn.

A straggling shrub, very aromatic (black currant smell); stems with many recurved prickles. *Leaves* opposite, 1-3.5 by .5-1.5 in., ovate or obovate, oblong, acute, crenate, rugose, sparingly scaberulous; base cuneate, rounded or cordate; petiole .2-.4 in. long. *Flowers* usually orange, varying to white or dark purple; bracts lanceolate, 3-5-ribbed; spikes subumbellate. *Fruit* .2 in. across, greenish-blue when ripe.

KHASI HILLS, and plains of ASSAM.

Introduced from tropical America and runs wild now. It is an invasive pest and tends to overrun forest areas to the exclusion of anything else. Once established, its eradication is very difficult and expensive.

Flrs. and Fr. Nearly all the year round.

2. LIPPIA Linn.

Lippia geminata H. B. & Kunth. Vern. *Pichas-lakri*, *Pichas-bon*, Sylh.; *Lopong-brik*, Mik.

A gregarious strongly aromatic shrub; branches slender, obscurely angled, hairy. *Leaves* 3-5 by .3-1 in., ovate-lanceolate or lanceolate, crenulate or crenate, serrate, acute, rugose, hairy and punctate above, pubescent beneath; base cuneate; petiole .2-.4 in. long. *Flowers* pink, scented, in dense peduncled cylindric subcapitate spikes elongating up to 1 in.; bracts ovate-acuminate, white, villous. *Calyx* silky. *Corolla* hairy, yellowish. *Stamens* 4, didynamous, enclosed. *Ovary* 2-celled; ovules solitary in each cell; stigma oblique, subcapitate. *Fruit* .08 in. across, with a dry epicarp splitting into 1-2-seeded pyrenes.

N. E. FRONTIER TRACT, KAMRUP, GOALPARA, SIB-SAGAR, NOWGONG, K. & J. HILLS.

Leaves are used as vegetables in KHASI HILLS.

Flrs. 2-3, but apparently flrs. & frt. nearly all the year round.

L. citriodora H.B. & K., is the lemon scented Verbena, native of S. America, commonly planted in gardens.

3. STACHYTARPHETA. Vahl.

Stachytarpheta jamaicensis (L.) Vahl=Stachytarpheta indica Vahl Enum.

A perennial, about 3 feet high; branches mostly dichotomous. *Leaves* 1-3.5 by .5-1.5 in., elliptic, ovate-elliptic, acute or obtuse, serrate or cuneate, dentate, almost glabrous; base cuneate or decurrent; petiole .1-.6 in. long. *Flowers* bluish, sessile, adpressed on rachis of terminal spikes and nestled in the depression enclosed by the bracts. *Stamens* 2, perfect; staminodes 2. *Ovary* 2-celled; style elongate; ovule solitary in each cell. *Fruit* .12-.17 in. long, dry, enclosed in the calyx tube separating into 2 hard 1-seeded pyrenes.

KHASI HILLS, GOALPARA, SIBSAGAR, DARRANG.

Flrs. Rainy season. Fr. 11.

S. mutabilis Vahl.—Native of tropical America. A shrub, often grown in garden.

Verbena officinalis Linn.—A perennial herb. *Branches* angular with woody root-stock. *Leaves* 1·4 by ·8·2 in., sub-sessile, ovate, or oblong or pinnatifid, puberulous. *Flowers* lilac in elongating spikes. *Fruit* included in the calyx; pyrenes 4 (or fewer), truncate, 3-ribbed.

KHASI HILLS (5000 ft.).

Flrs. Rainy season. Fr. Cold season.

Many Verbenas are beautiful garden plants.

Duranta Plumieri Jacq.—A large usually thorny shrub with drooping branches. *Leaves* ·5·1·3 by ·3··7 in., obovate or elliptic-acute, entire or partially serrate, almost glabrous; base narrowed into the petiole ·1··3 in. long. *Stamens* didynamous, included. *Ovary* 8-celled; stigma unequally 4-fid. *Fruit* a drupe, succulent with 4 hard 2-celled, 2-seeded pyrenes.

KHASI HILLS & PLAINS OF ASSAM. Cultivated.

Makes an excellent hedge.

Flrs. & Fr. Most of the year.

4. CALLICARPA Linn.

Shrubs or trees; young parts stellately tomentose. *Flowers* small, often glandular, in peduncled dense dichotomous cymes, shorter than the leaves. *Calyx* very small, not enlarged in fruit, 4-toothed. *Corolla* small, tubular-campanulate, lilac, purple or red, usually 4-(5-) lobed; lobe subquadrate, spreading. *Stamens* 4 (5) exserted; anthers glandular on the back. *Ovary* imperfectly 2-celled; style linear; stigma obscurely 2-fid; ovules 2 in each cell. *Fruit* a globose drupe supported by the calyx containing 1-4, 1-seeded pyrenes. *Seeds* exalbuminous.

Petiole long, exceeding 1 in.:—

Leaves entire or sub-entire; petiole upto 2 in. long:—

Leaves entire; calyx stellately pubescent. 1. *C. arborea*.

Leaves sub-entire; calyx almost glabrous in flower. 2. *C. vestita*.

Petiole short, not exceeding 1 in.:—

Leaves closely crenate; petiole ·3··1 in.

Drupe white. 3. *C. macrophylla*.

Leaves crenate-serrate; petiole ·05··3 in.

Drupe purple. 4. *C. rubella*.

Leaves denticulate; petiole ·1··3 in. Calyx glandular, scarcely hairy. 5. *C. psilocalyx*.

Leaves serrulate; petiole	·2·5 in.	Calyx	
stellately white, tomentose.	..	..	6. <i>C. longifolia</i> .
Leaves denticulate; petiole	·1·3 in.	..	7. <i>C. acuminata</i> .

1. Callicarpa arborea Roxb. Vern. *Mojonthi-phang*, Kach.; *Mai-phia*, Kuki; *Dieng-lakhiot*, Khasi; *Arhi-arong*, Mik.; *Khimbar*, *Maskhanchi*, Garo; *Phoja*, Jharua; *Gunmola*, *Maksi*, *Bonmola*, *Mach-kotta*, *Mach-peluka*, Ass.; *Mukhuang*, Naga; *Maiphi-thing*, Tipp.; *Selu*, Miri; *Yarphu-changne*, Duff.; *Saiom*, Manip.; *Maiphi*, Lushai; *Dhola-ujia*, Cach.

A small evergreen tree. *Bark* sometimes corky, brown, grey or darkish, rough with shallow fissures. *Blaze* yellowish brown, broader streaks turning darker with irregular strands of chocolate brown; innovation scruffy; under-surface of leaves, petiole and inflorescence stellate-tomentose. *Leaves* 3-12 by 1·5-5 in., elliptic-lanceolate, oblong or ovate-lanceolate, acuminate, entire or nearly so, coriaceous, glabrescent above, fairly stellate tomentose beneath; lateral nerves 8-12 on either half; base acute or cuneate; petiole ·5-2 in. long; cymes 2-5 in. across; peduncles up to 2 in. long. *Calyx* subtruncate, stellate-pubescent. *Corolla* ·15 in. long, purplish. *Drupe* ·1 in. across, purple, when ripe.

Common throughout the Province.

Poles are used as rollers of Synteng looms. Bark is chewed with betel leaf. Leaves are fodder for buffaloes.

The species has a tendency to become gregarious, apparently very useful in covering bare hill sides, e.g., in jhummed areas.

Flrs. 5-10. Fr. End of rainy season and cold season.

C. arborea Var. *oblongifolia* also occurs in the region of the flora.

2. Callicarpa vestita Wall. Vern. *Yarphu-changne*, Duff.

A small tree or shrub. *Bark* dark brown, warty; young shoots very shaggy with brown tomentum. *Leaves* 6-13 by 3-6 in., ovate-acuminate, sub-entire, coriaceous, **glabrous** above, thickly silky white, tomentose beneath; lateral nerves 8-12 on either half, sub-parallel, arcuate; base rounded or sometimes shallow cordate; petiole 1-2·2 in. long, brown, tomentose. *Inflorescence* in axillary brownish pubescent cymes; peduncles about 2 in. long, stellately pubescent.

Calyx almost glabrous in flowers. *Corolla* pinkish or pale purple, about .1 in. long, rather glabrous. *Fruit* a small globose drupe, about .1 in. in diameter.

DARRANG, KHASI HILLS.

Bark is chewed like that of *Careya arborea* by the Dufflas.

Flrs. 4.

3. *Callicarpa macrophylla* Vahl. Vern. *Gupora-asing*, Miri; *Bonmala*, *Tong-loti*, Ass.; *Sam-mojonti*, Kach.; *Chapite-rakal*, Kuki.

A large spreading shrub; young parts and inflorescence stellately woolly. *Bark* brown, thin, smooth. *Leaves* 3.8.5 by 1.2.3 in., oblong-elliptic or ovate-lanceolate, acuminate, crenate or crenate-dentate, coriaceous, glabrate or fairly pubescent above, densely stellate-tomentose beneath; lateral nerves 10-16 on either half; base acute or truncate; petiole .5-1.25 in. long. *Flowers* rose pink in dense dichotomous cymes, .2 in. across; peduncle upto 1 in. long. *Calyx* .1 in., stellate-pubescent, glabrate with age; teeth minute. *Corolla* lobes subequal, spreading. *Drupe* .12-.18 in. across, white.

DARRANG, SIBSAGAR, N.E. F. TRACT, NOWGONG, N. C. HILLS, GOALPARA, KHASI HILLS (5,000 ft.).

Poultice of bark is applied for headache.

Flrs. & Fr. Practically throughout the year.

4. *Callicarpa rubella* Lindl. Vern. *Soh-eitksar*, *Jalang-koai*, Khasi; *Dieng-la-khangwet*, *Dieng-lakso-niaw*, Synt.

An erect shrub; stem whitish, 15-20 in. long. *Leaves* 2.7 by .8-2 in., oblong-lanceolate or obovate-lanceolate or elliptic-lanceolate, acuminate, crenate-serrate, coriaceous, hairy above, tomentose beneath. *Flowers* red in stellately tomentose cymes, 1-2 in. across. *Calyx* stellate-tomentose in flower. *Drupe* .12-.18 in. across, purple.

KHASI HILLS (5,000 ft.).

Bark and root are chewed like betel-nuts.

Flrs. Rainy season. Fr. Cold season.

5. *Callicarpa psilocalyx* Clarke. Vern. *Pylleng-tham*, *Dieng-soh-sim-um*, Khasi.

A small tree or a shrub with straggling branches; extremities stellate-pubescent. *Leaves* 1·5-7·5 by ·7-2·5 in., elliptic-lanceolate, acuminate, denticulate or serrate, membranous; midrib and the nerves hairy, conspicuously stellate-hairy along the nerves beneath, minutely gland-dotted; lateral nerves 4-7 on either half, arcuate; base rounded or cuneate; petiole ·2-·4 in. long. *Flowers* in few flowered cymes, ·5 in. across. *Calyx* greenish or pinkish, 4-toothed, gland-dotted. *Drupe* ·1 in. across, white.

KHASI HILLS.

Flrs. 6. Fr. 8-9.

6. *Callicarpa longifolia* Lamk. Var. *lanceolarium* F. B. I. Vern. *Dieng-soh-kait-lang*, Khasi.

A shrub up to 15 ft. high; young parts densely stellate-pubescent; stem whitish, smooth. *Leaves* 2-8 by ·6-2 in., narrow-lanceolate, elliptic, elliptic-lanceolate, acuminate, serrulate, membranous, glabrate above dotted with numerous minute glands beneath, stellately pubescent along the nerves; lateral nerves 10-13 on either half; base cuneate; petiole ·2-·8 in. long. *Flowers* rose or purple on spreading somewhat lax cymes upto 1·5 in. across; pedicels glandular, specially at the junction with the calyx. *Calyx* glabrate, truncate. *Corolla* ·1 in. across; lobes subequal. *Drupe* ·1 in. across, white.

GOALPARA, SIBSAGAR, KHASI HILLS (3,000 ft.).

Flrs. Rainy season. Fr. Cold season.

7. *Callicarpa acuminata* Roxb.

A tawny stellately tomentose shrub. *Leaves* 4·5-6 by 1·2-2·2 in., oblong, ovate-lanceolate or elliptic-lanceolate, acuminate, denticulate, membranous, scaberulous above and stellate, tomentose beneath, becoming more or less glabrate when mature, specially in upper surface; lateral nerves

6-8; base usually cuneate; petiole .1-.3 in. long. *Flowers* in axillary dichotomous paniced cymes.

KHASI HILLS.

Flrs. Rainy season.

5. TECTONA Linn. f.

1. *Tectona grandis* Linn. Teak. Vern. *Segun*, Beng.

A large deciduous tree, often fluted near the base. *Bark* pale brown, grey, striate, fibrous, peeling off in thin strips; branchlets 4-angled, channelled, stellate-pubescent. *Leaves* 6-24 in. long, broadly elliptic or obovate, entire, rough above, stellate-tomentose beneath; main lateral nerves 8-12 on either half; base cuneate; petiole 1.5-2.5 in. long, flattened. *Flowers* white, about .25 in. across, in large terminal pubescent panicles of cymes 2-3 ft. long, with decussate branching; bracts lanceolate, oblong-acute. *Calyx* in flower campanulate, stellate-tomentose, .12 in. long, teeth 5-6, spreading, minute, much enlarging in fruit and forming an inflated sparingly pubescent covering to it about 1 in. across. *Corolla* funnel-shaped; tube short; lobes 5-6, subequal, spreading, imbricate in bud. *Stamens* 5-6, inserted near the base of the corolla tube, exserted. *Ovary* densely hairy, 4-celled; ovules solitary in each cell; stigma shortly bifid. *Fruit* a subglobose drupe, .5-.7 in. across, with thick shaggy exocarp of matted hairs, endocarp hairy. *Seeds* 1-4, exalbuminous.

Cultivated in the plain districts of ASSAM. There is a fairly big old plantation in Kulsī (KAMRUP). Also a small old plantation at Margherita (R. N. De).

Teak timber is too well-known to need any description.

Flrs. 7-8. Fr. Cold season.

6. GMELINA Linn.

1. *Gmelina arborea* Linn. Vern. *Gammari*, Kach.; *Dieng-lophiang*, Khasi; *Gambari*, Mech.; *Bol-gippok*, Garo; *Gamri*, Jharua; *Phang-arong*, Mik.; *Gomari*, Ass.; *Gamair*,

Sylh.; *Thlan-vong*, Lushai; *Wang*, Manip.; *Anvong*, Kuki; *Imbeh-ching*, Naga.

A deciduous tree. *Bark* dark grey or ashy, warty with lenticular tubercles, exfoliating in irregular plates which leaves shallow depressions; blaze greenish white, turning brown, green below the cuticle; young parts densely tomentose. *Branchlets* nearly pubescent, quadrangular. *Leaves* 3-8 by 2·5-6 in., broadly ovate-acuminate, subcoriaceous, glabrescent above, fairly tomentose or almost glaucous beneath; lateral nerves 6-10 on either half, lowest sub-basal; base subcordate or truncate, often abruptly cuneate and usually with 2 glands at the junction of the puberulous petiole 1·4-5 in. long. *Flowers* 1 in. across, brownish-yellow, in decussate cymes arranged on a terminal tomentose panicles up to 12 in. long; bracts linear-lanceolate. *Calyx* ·2 in. long, cupular or funnel-shaped, pubescent, persistent in fruit; teeth 5, acute. *Corolla* pubescent with crenulate margin. *Stamens* 4, didynamous. *Ovary* 4-celled; style slender; stigma unequally bifid; ovules solitary in each cell. *Drupe* succulent, ovoid or pyriform, about 1 in. long, glossy and yellow when ripe; pulp aromatic; endocarp bony. *Seeds* 1-3, lenticular, exalbuminous; cotyledons fleshy.

Common throughout the Province.

Wood greyish or yellowish white, close and even grained, light, seasons well, easily workable and takes a fine polish, strong and durable. Excellent timber for furniture, planking and many other purposes.

The fruit, root and bark are used in Hindu medicine.

The juice of the leaves is used to remove fœtid discharges from ulcers. (*I.M.P.*).

Flrs. 2-4. Fr. 5-7.

7. PREMNA Linn.

Trees or shrubs, sometimes scandent, rarely herbaceous. *Leaves* opposite or ternate, entire or toothed. *Flowers* small, often polygamous, white or greenish in paniced or corymbose cymes. *Calyx* truncate or minutely 2-5-toothed, occasionally lipped. *Corolla* small; tube short, hairy inside; limb 2-lipped or sub-equally 4- or 5-lobed. *Stamens* didynamous;

anther-cells parallel or divergent. *Ovary* 2- or 4- celled, 4-ovuled; style linear; stigma shortly bifid. *Fruit* a small drupe seated on the calyx, globose or obovoid, with 1-4-celled stone; endocarp rugose or verrucose, usually with 2 basal cavities in the centre. *Seeds* oblong, exalbuminous; cotyledons flat.

Inflorescence elongate, thyrsoid :—

Leaves upto 4·5 by 2 in.; petiole ·2-·6 in.

Calyx glabrate, lobed half way down into 2-rounded lobes or sub-truncate:—

A small tree often epiphytic. 1. *P. racemosa*.

Leaves upto 9 by 4·75 in.; petiole ·1-·16 in., sparsely pubescent outside. Calyx cup-shaped with 2-rounded lobes. Corolla hairy on the throat:—

A shrub or a small tree often climbing. 2. *P. interrupta*.

Leaves upto 6 by 2·5 in.; petiole ·1-·3 in. Calyx densely puberulous, lips obscurely toothed. Corolla hardly hairy at the throat:—

A tree. 3. *P. bracteata*.

Leaves 2·5-8 by 1-3 in.; petiole ·5-1·5 in. Calyx obscurely 2-lipped, 5-toothed, stellately tomentose. Corolla lobes stellately tomentose without:—

A large shrub. 4. *P. punduana*.

Inflorescence corymbiform:—

Leaves entire or undulate. Corolla 2-lipped or entire:—

Leaves usually glabrous; petiole upto 1·5 in.:—

Leaves coriaceous, sub-cordate, greenish yellow. Corolla tube twice the length of the calyx, hairy within near the lower part:—

A shrub. 5. *P. cordifolia*.

Leaves coriaceous, cordate. Corolla tube white, not twice the length of the calyx, hairy at the throat:—

An extremely straggling or climbing shrub. 6. *P. coriacea*.

Leaves membranous; base rounded or cuneate. Corolla bearded at the throat. Calyx cup-shaped, nearly entire:—

A large climbing shrub. 7. *P. scandens*.

Leaves cordate-acuminate; base obtuse. Corolla glabrous without; throat somewhat hairy. Calyx 2-lipped, obscurely 5-toothed:—

A subscent shrub. 8. *P. khasiana*.

Leaves acute, obtuse or sub-cordate. Petiole upto 2·5 in. long. Corolla greenish white, hairy in the throat. Calyx 2-lipped, lower lip distinctly 3-toothed:—

A tree. 9. *P. longifolia*.

Leaves oblong-ovate or broad-elliptic, 2·4 by 1·2·5 in.; base rounded or sub-acute. Petiole 4·7 in. long. Corolla yellowish green, sub-equally 4-lobed. Calyx 2-lipped; one-lip 2-toothed, the other sub-entire:—

A small tree or shrub; large branches often thorny. 10. *P. corymbosa*.

Leaves hairy or tomentose. Calyx 4·5 toothed:—

Hairs stellate:—

Leaves 4·8 by 3·5 in.; petiole 1·5·3 in. long. Corolla stellately villous within. 11. *P. pyramidata*.

Leaves 3·10 by 1·5·4 in., petiole 5·1·75 in. long. Corolla throat hairy. 12. *P. bengalensis*.

Hairs as a rule not stellate:—

Leaves glabrous above; base rhomboid; lateral nerves 8·11 on either half. Petiole upto 4 in. long. 13. *P. milleflora*.

Leaves glabrescent above; base cuneate or rounded, sometimes shallow cordate; lateral nerves 6·8 on either half; petiole upto 8 in. long. 14. *P. latifolia*.

Leaves setulose above; base rounded; petiole upto 1·5 in. long. 15. *P. micrantha*.

Inflorescence corymbiform or pyramidal:—

Leaves usually dentate or serrate; petiole about 1 in.:—

Calyx sub-equally 4-toothed, enlarged and ribbed in fruit. Corolla hairy at the throat:—

A small tree or shrub. 16. *P. barbata*.

Calyx sub-equally 5-toothed, glandular.

Corolla glabrous:—

Low undershrub. 17. *P. pinguis*.

Leaves shortly petioled; petiole about .25 in. long; bracts minute:—

Calyx cup-shaped, minutely 5-toothed.

Corolla throat hairy:—

A branching shrub. .. 18. *P. esculenta*.

Leaves sessile; bracts .25 in. long:—

Calyx enlarged in fruit, deeply 2-lipped:—

A low undershrub. .. 19. *P. macrophylla*.

Leaves sessile. Calyx cupular, sub-equally 4-toothed. Corolla throat hairy. .. 20. *P. herbacea*.

1. *Premna racemosa* Wall. Vern. *Dieng-thalap*, Khasi.

A small tree, occasionally epiphytic. *Bark* greyish brown, rough, granular, .12 in. thick; blaze light red. *Leaves* 1.5-4.5 by .8-2 in., ovate, obovate- or elliptic-oblong, acute or acuminate, obscurely crenulate, membranous, almost glabrous, sometimes sparsely pubescent along the nerves; lateral nerves 4-5 on either half; base cuneate or decurrent; petiole .2-.5 in. long. *Flowers* whitish, scented, in interrupted spiciform cymose clusters upto 3.5 in. long. *Calyx* glabrate, bilabiate. *Corolla* .16 in. long, whitish, 4-lobed, hairy within. *Filaments* hairy at base. *Ovary* almost glabrous at the apex. *Drupe* .16 in. long, narrowly obovoid.

K. & J. HILLS (5,000 ft.).

Flrs. 4-6. Fr. 7-9.

2. *Premna interrupta* Wall.

A shrub or small tree, sometimes climbing (Gamble); young parts pubescent. *Leaves* 4-8 by 2-4.5 in., obovate or ovate, shortly acuminate, entire, subcoriaceous, glabrous; lateral nerves 6-8 on either half; base narrowed into the petiole .1-.16 in. long. *Flowers* sessile, in compact almost sessile cymes arranged in long terminal cylindrical spike usually interrupted towards the base; bracts lanceolate, foliaceous, about .5 in. *Calyx* of two small thick segments. *Corolla* throat hairy; lobes short, oblong. *Stamens* 4, exserted. *Ovary* 4-celled.

KHASI HILLS (Brandis P. 509).

Flrs. 6-7.

3. *Premna bracteata* Wall. Vern. *Dieng-ladi-um*, Khasi.

A tree, having an epiphytic tendency. *Bark* ashy, granular, .25 in. thick, plain; blaze cream-coloured with brown vertical lines. *Leaves* 2-6 by 1.3-2.5 in., elliptic, ovate-elliptic or obovate-elliptic, subentire, acuminate, glabrous; lateral nerves 7-8 on either half; veins conspicuous, reticulated beneath; base cuneate; petiole .1-.3 in. long, somewhat marginate. *Flowers* whitish, cymosely clustered in paniced spikes. *Calyx* puberulous. *Corolla* .12 in., not hairy at the throat.

K. & J. HILLS 4 000 ft. (Kanjilal's No. 6715).

Flrs. 3-6.

4. *Premna punduana* Wall. Vern. *Gohora*, Ass.

A large shrub or a small tree, grows upto 4-5 ft. in girth; young parts stellate tomentose. *Leaves* 2.5-8 by 1-3 in., ovate-oblong, elliptic or elliptic-oblong, entire, acuminate, thinly coriaceous, pubescent along the midrib above, stellate tomentose beneath; lateral nerves 7-9 on either half; base obtuse or rounded; petiole .5-1.5 in. long. *Flowers* in large terminal thyrsoid paniculate cymes. *Calyx* 5-toothed, stellate-tomentose, obscurely 2-lipped. *Corolla* 2-lipped, stellate-tomentose without. *Drupe* .15-.2 in. across, globose.

KHASI HILLS (1-2,000 ft.). KAMRUP.

Timber is said to be good.

Flrs. 5-6. Fr. 7-9.

5. *Premna cordifolia* Roxb.

A shrub, sometimes scandent. *Bark* dark brown. *Leaves* 2.5-6 by 1-2.5 in., ovate, oblong-ovate, oblong-elliptic, entire, acuminate, coriaceous, almost glabrous; lateral nerves 4-6 on either half; base rounded or sub-cordate; petiole slender, .5-1.5 in. long. *Flowers* greyish in dense terminal corymbiform cymes; pedicels very short. *Calyx* 2-lipped; upper lip 2-lobed; lower entire. *Corolla* .25 in. long; 2-lipped, densely hairy within; tube twice the length of the calyx; anther-cells shortly divergent. *Ovary* glabrous;

style as long as the corolla tube. *Drupe* ovoid or sub-globose, .25 in. across, 3-4-seeded. *Seeds* ovoid-acute.

LAKHIMPUR, SIBSAGAR, CACHAR, NAGA HILLS.

Flrs. 11. Fr. Cold season.

6. *Premna coriacea* Clarke (Var. *oblonga* and *cuneata*).

A climbing shrub, having epiphytic tendency. *Leaves* 3-7 by 1.2-3 in., orbicular-ovate, elliptic-lanceolate or lanceolate, entire, shortly acuminate, coriaceous, glabrous; lateral nerves 4-7 on either half; veins underneath are elegantly reticulated; base rounded or shallow cordate or cuneate; petiole .5-1.5 in. long. *Flowers* in large, spreading, terminal, pubescent, paniculate, corymbose cymes; pedicels short; bracts about .1 in., scattered. *Calyx* truncate, slightly pubescent, obscurely lipped. *Corolla* .15 in., densely hairy in the throat; lobes 4, greenish-white, subequal; filaments hairy. *Ovary* glabrous. *Drupe* .2 in., narrowly obovoid, 1-seeded, black on ripening.

KHASI HILLS, GOALPARA, SYLHET.

Flrs. 4-5. Fr. End of rainy season.

7. *Premna scandens* Roxb. Vern. *Laidap-marphu*, Kach.

A large scandent shrub. *Bark* dark greenish-black with large white lenticels both horizontal and vertical. *Leaves* 3-6 by 1.5-2.5 in., elliptic, elliptic-oblong or ovate-oblong, entire, abruptly acuminate, membranous, glabrous; lateral nerves 5-7 on either half, with elegant reticulate venation beneath; base rounded or cuneate; petiole 1-1.5 in. long, channelled. *Flowers* small in large compound, flat-topped corymbiform cymes. *Calyx* greenish, cup-shaped, more or less truncate, glabrous. *Corolla* glabrous, greenish with a large tuft of white hairs closing the mouth of the corolla tube. *Stamens* exerted; filaments and anthers whitish. *Drupe* sub-globose, smooth, tubercled, blackish on ripening.

N. C. HILLS, GOALPARA, KHASI HILLS, SYLHET, CACHAR.

Flrs. 5. Fr. Cold season.

8. Premna khasiana Clarke.

A small tree. *Leaves* 4-6 by 2-4 in., ovate or broadly ovate, entire, caudate-acuminate, coriaceous, sparsely pubescent along the nerves; lateral nerves 5-7 on either half; base usually obtuse, sometimes rounded; petiole 1-3-2 in. long. *Flowers* in large pubescent corymb. *Calyx* bilabiate, obscurely 5-toothed. *Corolla* .12 in. long, glabrous; lobes 4, almost equal, glabrous outside. *Drupe* .12 in. across, globose.

KHASI HILLS (4,000 ft.).

Flrs. Hot season. Fr. Rainy season.

9. Premna longifolia Roxb. Vern. *Gobra-bhodia*, Ass.; *Gambolthaprap*, Garo.

A small tree (28'/20'' usually, but trees seen up to 7 ft. in girth-U. Kanjilal). *Bark* fairly smooth, greenish grey, light dun inside, turning tan brown, mottled with coarse shades of dark brown, .3-.5 in. thick. *Wood* with unpleasant smell. *Leaves* 8 by 4 in., ovate-acute, entire, coriaceous, glabrous; lateral nerves 5-7 on either half, conspicuous; base rounded; petiole 3-4 in. long. *Inflorescence* corymbiform, terminal. *Calyx* bilabiate, obscurely toothed. *Corolla* greenish-white, .12-.16 in. long, hairy on the throat. *Drupe* globose, 4-seeded, .2 in. across (Roxburgh).

GARO HILLS.

Flrs. Hot season. Fr. 7.

10. Premna corymbosa (Burm. f.) Roth et Willd. Var. *obtusifolia* (R. Br.) *P. integrifolia*, *P. serratifolia* Linn. Vern. *Genderi*, *Ganioli*, Ass.; *An-ke lok*, Mik.; *Pitang-asing*, Miri; *Gejeri*, Nep.; *Parta-pipi*, Duff.; *Dieng-lah-marwai*, Khasi; *Gunal*, Sylh.

A small tree or large shrub; trunk and larger branches often thorny. *Bark* yellowish green, lenticellate, white inside. *Leaves* 2-4 by 1-2-5 in., oblong-ovate or broadly elliptic or oblong-obovate, entire, undulate, sometimes coarsely dentate towards the apex, sub-obtuse or very shortly acuminate, glabrous on maturity; lateral nerves 4-5 on either

half; base rounded or sub-acute; petiole .4-.7 in. long. *Flowers* small, greenish yellow in sparsely pubescent terminal paniculate dense corymbose cymes. *Calyx* 2-lipped; one lip 2-toothed; the other sub-entire. *Corolla* subequally 4-lobed; 1 lobe white; 3 green (Haines). *Drupe* .2 in. across, globose, endocarp obscurely verrucose.

N. E. F. TRACT, LAKHIMPUR, DARRANG, NOWGONG, KAMRUP, GOALPARA, SYLHET, KHASI HILLS.

The wood is scented, light-creamy brown, even-grained—moderately hard. Leaves are used medicinally.

Flrs. 4-5. Fr. 8-9.

11. *Premna pyramidata* Wall.

A moderate sized deciduous tree; young parts softly and densely stellate-tomentose. *Leaves* 4-8 by 3-5 in., ovate, elliptic-oblong, sub-orbicular, entire or slightly undulate, shortly acuminate, chartaceous, glabrescent above, softly and densely tomentose beneath; lateral nerves 6-9 on either half; base rounded, obtuse or sub-cordate; petiole 1.5-3 in. long, pubescent. *Flowers* yellowish, in stellately tomentose, bracteate, paniculate cymes; bracts linear. *Calyx* 5-toothed, stellate-tomentose. *Corolla* about .13 in. long. *Drupe* .16-.2 in. long, ovoid, glabrous.

SIBSAGAR (Kaziranga). U. N. Kanjilal No. 1999.

Flrs. Hot season. Fr. End of rainy season.

12. *Premna bengalensis* Clarke. Vern. *Situ-asing*, Nanji-asing, Miri; *Lalo-asing*, Abor; *Gohora*, Ass.; *Dhola-ujā*, Cach.; *Pakhir-har*, Phongta, Sylh.; *Jol-chong-i-maiphi*, Kuki; *Nakechal*, Tipp.; *Dhauili*, Mech.; *Bolgoppo*, Garo; *Arhikelok-arong*, Mik.; *Mlung-greng*, Kach.; *Dieng-lih*, Khasi.

A middle sized evergreen tree often grows to a large size (95'/125"); stem irregularly often fantastically fluted. *Bark* greyish white, exfoliating in thin corky papery flakes, inside very light dun, .1 in. thick; young parts stellately tomentose. *Leaves* 3-10 by 1.5-4 in.; ovate, ovate-oblong or elliptic, entire acuminate, thinly coriaceous, stellate-pubescent along the midrib above, stellately pubescent beneath,

specially when young; lateral nerves 7-12 on either half, sub-parallel, arcuate; base rounded; petiole .5-1.75 in. long. *Flowers* in large paniculate, stellately pubescent, terminal, corymbiform paniced cymes. *Calyx* pubescent, 5-toothed, obscurely 2-lipped. *Corolla* white, greenish white or yellowish, 2-lipped with a row of hairs in the throat, tomentose outside. *Drupe* globose, obscurely verrucose, .16-.2 in. long.

Common throughout the Province.

Wood yellowish, hard. The timber is used as house posts and is said to be very durable.

Flrs. 5-7. Fr. 8-11.

13. *Premna milleflora* Clarke. Vern. *Dieng-Phonri*, Khasi; *Gambhariskhal*, Garo; *Gobra-bhodia*, Rabha; *Gambarisila*, Kach.; *Mnn-wong-chal*, Kuki.

A tree upto 7 ft. in girth. *Bark* greenish grey outside; blaze light dun mottled with evenly distributed coarse strands of darker brown, turning deeper brown .5-.7 in. thick. *Leaves* aromatic, 4-8 by 3-5.5 in., ovate, entire, acuminate, coriaceous, glabrous above, pubescent along the nerves beneath; lateral nerves 8-11 on either half, arcuate; base rhomboid; petiole upto 4 in. long. *Corymbs* very numerous flowered, large, about 12 in. across. *Calyx* obscurely 2-lipped, 4-5-toothed, finely pubescent. *Corolla* throat hairy. *Drupe* .1 in. across, globose, obscurely tubercled.

N. C. HILLS, GOALPARA, GARO HILLS, MIKIR HILLS, KHASI HILLS.

Wood with unpleasant smell, used as house posts and said to be durable against insect attacks.

Flrs. 6-7. Fr. Cold season.

14. *Premna latifolia* Roxb. Vern. *Phe-phe-arong*, Mik.; *Gainali*, Kamrup; *Dieng-la-marwai*, *Dieng-soh-phan-dkhar*, Khasi; *Harmuphang*, *Gundari-phang*, Kach.; *Dukhemi*, *Tuthekmi*, Garo; *Gunaru*, *Gonderi*, Ass.; *Gejeru*, Nep.; *An-ke-lok-arong*, Mik.; *Arekadoi*, Kuki.

A middle sized tree with spreading crown 30'/60"; young shoots pubescent; young stem spinous. *Bark* grey,

somewhat rough outside; blaze slightly greenish white, soft and crisp (like potato) sweetish; drying black. *Leaves* unpleasant smelling, 2·5-7·5 by 2-4 in., ovate or elliptic, usually entire, undulate, acuminate, thinly coriaceous, glabrescent above, softly pubescent beneath, specially along the nerves; lateral nerves 6-8 on either half; base cuneate, rounded, occasionally shallow cordate and then slightly decurrent; petiole ·5-·9 in. long. *Flowers* greenish, usually in terminal compound corymbose villous cymes. *Calyx* ·08 in., obscurely 2-lipped, 4-5-toothed, accrescent in fruit upto ·2 in. long. *Corolla* about ·13 in. long, 2-lipped, throat villous. *Style* unequally 2-fid. *Drupe* ·16-·2 in. across, globose, black on ripening, hardly verrucose.

Common throughout the Province.

Wood hard. (Bark eaten during famine).

Flrs. 4-6. Fr. Cold season.

Var. mucronata Clarke. Syn. *P. mucronata* Roxb. Larger tree, 6 ft. to 8 ft. in girth. *Bark* blackish, ·75 in. thick; blaze white. *Leaves* 2·5-5 by 1·5-3 in., acumen longer; base abruptly cuneate or rounded. *Inflorescence* flat topped. *Drupe* verrucose.

NOWGONG, SIBSAGAR.

Wood cream-coloured, hard. (Bark eaten during famine).

Flrs. 4-6. Fr. Cold season.

15. *Premna micrantha* Schauer.

Leaves 3·25 by 1·75 in., ovate-acuminate, entire, setulose above, somewhat pubescent beneath. *Flowers* minute in pubescent compound corymbs. *Calyx* ·04-·06 in., minutely 5-toothed.

(F.B.I., P. 578 Vol. IV) (SYLHET—Similar to *P. flavescens* Ham. Brandis P. 511).

No specimen in Forest Herbarium, Shillong.

16. *Premna barbata* Wall. Vern. *Dieng-phonri*, Khasi.

A small tree or shrub (40'/38"). *Bark* grey or pale brown outside, rather rough, softly corky; inside greenish white mottled with brown, turning darker brown ·1 in. thick; young parts pubescent. *Leaves* aromatic, 1·5-7 by 1·5-3·5 in., oblong or ovate, distantly cuspidate-serrate

towards the apex, acuminate, often caudate, thinly chartaceous, glabrescent when mature; lateral nerves 5-7 on either half; base rounded or sub-cordate; petiole .5-2 in. long, channelled, sparsely puberulous. *Flowers* greenish white, about .2 in. across, in terminal corymbose panicles. *Calyx* .08 in., pubescent, 4 toothed; teeth obtuse, not enlarged in fruit. *Corolla* .1-.2 in. long, 2-lipped, throat hairy; lobes 4, obtuse. *Drupe* .15-.2 in. across, glabrous, globose or obovoid, obscurely verrucose, purple when ripe.

NOWGONG, DARRANG. GOALPARA. KHASI HILLS.

Flrs. 4. Fr. 6.

17. *Premna pinguis* Clarke. Vern. *Phonri-khyndow*, Khasi.; *Phang-long-le*, Mik.

A small shrub or an undershrub upto 12 ft. high. *Leaves* 4-8 by 2-5 in., ovate-acuminate, occasionally obtuse, serrate, nearly to the base, rather membranous, pubescent specially along the nerves; lateral nerves 4-6 on either half; petiole .8-3 in. long. *Inflorescence* 1.5-2.3 in. across. *Calyx* campanulate, sub-equally 5-toothed, somewhat accrescent in fruit, almost glabrous. *Corolla* pale white. *Drupe* reddish brown, obovoid, about .15 in. across.

KHASI HILLS, NOWGONG.

Flrs. 45. Fr. 67.

18. *Premna esculenta* Roxb.

A short stemmed branching shrub, glabrous. *Leaves* 4-8 by 1-2.9 in., obovate or elliptic or elliptic-lanceolate, acuminate, sharply serrate, membranous, glabrous, paler beneath; lateral nerves 4-7 on either half; base cuneate or acute; petiole .2-.3 in. long. *Flowers* in dense globose corymb; peduncle short. *Calyx* .06 in., obscurely toothed, somewhat enlarged and cup-shaped in fruit. *Corolla* 2-lipped, throat hairy. *Drupe* globose, .12 in. across.

ASSAM (F.B.I. P. 580 Vol. IV, Brandis P. 511).

Flrs. 4-5. Fr. 8-9.

19. *Premna macrophylla* Wall.

An undershrub. *Leaves* 4-9 in., oblanceolate or obovate, remotely crenate or toothed, coriaceous, glabrous; lateral nerves 4-5 on either half; base attenuate; petiole .1-.2 in. long. *Flowers* in dense shortly peduncled globose pubescent corymbs; bracts hairy, persistent, linear-lanceolate. *Calyx* 2-lipped, striate in fruit. *Drupe* .16-.2 in. long, rugose, usually 2-seeded (Kurz).

MANIPUR (Brandis 511).

Flrs. 4-6. Fr. 7.

20. *Premna herbacea* Roxb. Vern. *Mati-pharuwa*, *Bol-sal-thanuri*, Garo; *Matia-jam*, Ass.

A small undershrub from a woody root-stock; shoots herbaceous upto 5 or 6 in. high. *Leaves* sessile, 1-5 by .8-3 in., often in rosettes near the ground or opposite in longer shoots, obovate, coarsely toothed, obtuse, membranous, glabrescent above, puberulous along the nerves beneath; lateral nerves 4-6 on either half. *Flowers* white or greenish yellow, about .1 in. across, in terminal corymbose panicles. *Calyx* pubescent, cupular, 4-toothed, slightly accrescent in fruit. *Corolla* .2 in. long, obscurely 2-lipped, 4-lobed, throat hairy. *Drupe* globose, about .25 in. across, black, glossy.

DARRANG, GARO HILLS, KAMRUP, N. C. HILLS, SIBSAGAR, KHASI HILLS. Found in GOALPARA also. (R. N. De).

Common in grass land.

The roots are considered medicinal. Juice of leaves is rubbed on the body also and applied to the head in fever to reduce temperature. Ripe fruit is eaten (Kamrup).

Flrs. 1-4. Fr. 5-7.

8. VITEX Linn.

Trees or shrubs. *Leaves* opposite, digitately 3-7 foliolate, rarely 1-foliolate, often aromatic or fœtid. *Flowers* in sessile or pedunculate cymes forming terminal and axillary or wholly axillary panicles or corymbs; bracts small, larger or shorter than the calyx. *Calyx* campanulate, truncate or shortly 3-5-toothed, usually enlarged in fruit. *Corolla* 2-lipped; tube short; upper lip of 2 and lower of 3 lobes,

central lobe usually by far the largest. *Stamens* 4, didynamous, usually exserted; anther-cells at first parallel and pendulous, afterwards divaricate. *Ovary* 2-4-celled; ovule solitary in each cell; style filiform; stigma bifid. *Drupe* globose or obovoid, supported by the somewhat enlarged calyx; endocarp bony. *Seeds* obovate or oblong, exalbuminous; cotyledons fleshy.

Inflorescence terminal, occasionally axillary:—

Petiole without wings:—

Shrubs or small trees:—

Leaves 1-3 foliolated, sessile, margin entire. 1. *V. trifolia*.

Leaves 3-5 foliolated, petioluled, margins somewhat crenate. 2. *V. Negundo*.

Trees:—

Leaves chartaceous (pubescent), usually 3-foliolated (occasionally 4 or 5):—

Leaflets sessile or nearly so:—

Bracts large, conspicuous, persistent:—

Calyx 5-toothed. 3. *V. pubescens*.

Leaves generally 5-foliolated:—

Leaflets petioluled:—

Bracts very small, deciduous:—

Calyx obscurely 5-lobed. 4. *V. canescens*.

Leaves membranous, as a rule 5-foliolated, almos. glabrous:—

Calyx truncat.:—

Leaflets petioluled:—

Bracts very small, caducous. 5. *V. quinata*.

Petioles winged:—

Trees:—

Leaves 3 (-5) foliolated:—

Leaflets sessile or sub-sessile, lanceolate, entire:—

Branches of inflorescence interrupted cymes, shortly peduncled or clustered. 6. *V. altissima*.

Leaves 3-foliolated:—

Leaflets sessile, ovate or elliptic-lanceolate:—

Branches of thyrsus spiciform. 7. *V. limonifolia*.

Inflorescence almost axillary:—

Leaves 3-foliolated, pubescent or woolly:—

Cymes sessile:—

Corolla yellow, glandular. 8. *V. vestita*.

Leaves 3-foliolated with shining resinuous glands on the underside:—

Cymes long, peduncled:—

Corolla grey-pubescent. 9. *V. peduncularis*.

Leaves 5(-3) foliolated, glabrate:—

Cymes pedunculate:—

Corolla white and purple. 10. *V. glabrata*.

1. *Vitex trifolia* Linn.

A shrub or a small tree. *Bark* ashy grey, smooth; branchlets obscurely quadrangular, tomentose. *Leaves* 1-3 in., often foliolated. *Leaflets* .5-2 by .3-.8 in., (Assam forms) elliptic or obovate, ovate-oblong, entire, obtuse or acute, glabrous above, mattedly greyish white, tomentose beneath; base rounded or cuneate; lateral leaflets sessile, petiolule or terminal leaflets 0-1 in. *Panicles* 1-5 in. long; flowers lavender to blue. *Calyx* very shortly 5-toothed, .08-.17 in. long, greyish, tomentose. *Corolla* .25-.5 in. long, tomentose. *Filaments* hairy at the base. *Ovary* glandular-dotted. *Drupe* .2 in. across, ellipsoid, blackish.

LAKHIMPUR.

Flrs. & Fr. 2.

2. *Vitex Negundo* Linn. Vern. *Pasutia*. *Aggia-chita*, Ass.; *Hing-rain*, Sylh.; *Nishunda*, Beng.

A large strongly scented deciduous shrub or a small tree. *Bark* thin, grey or ashy white; blaze yellow; branchlets striate; shoots, inflorescence and undersurface of leaves grey-pubescent. *Leaves* digitately 3-5-foliolate; petiole 1-2 in. long. *Leaflets* 1-5-5 by .5-1-5 in., lanceolate or narrow-lanceolate, acuminate or acute, entire, crenulate or coarsely toothed, membranous, glabrescent above; base cuneate or rounded; petiolule 0-8 in., terminal leaflets having longer petiolule. *Flowers* lavender to blue, .2 in. across, in opposite cymes, arranged on an elongated panicle up to 12 in. long. *Calyx* about .1 in. long, campanulate, 5-toothed; teeth triangular. *Corolla* .4 in. long, pubescent outside, 2-lipped; upper 2-lobed, lower longer, 3-lobed; middle lobe longest, crenulate.

Stamens exserted, ovoid; filaments villous at the base. *Drupe* about .2 in. across, slightly ribbed, gland-dotted.

Common throughout the Province.

The twigs are used for basket making.

The leaves and roots are regarded as febrifuge and tonic.

Flrs. 4-8. Fr. Cold season.

3. *Vitex pubescens* Vahl. Vern. *Thang-thang-arong*, Mik.; *Ahoi*, Ass.; *Bhadruk*, *Aoal*, Sylh.; *Miong-greng-phang*, Kach.; *arekodol*, Tipp.; *Dieng-lakhiet-dkhar*, Khasi; *Bhodia*, *Bandegiri*, Garo.

A large tree (95'/132'') much fluted. *Bark* grey or greyish brown, corky, slightly fissured, .25 in. thick; inside finely fibrous, yellowish, granular, turning blackish green; branches spreading, quadrangular, lenticellate. *Leaves* usually 3-foliolate (-5); leaflets 2-7 by 1-3 (middle largest) ovate or obovate, oblanceolate, elliptic-lanceolate, acute or acuminate, entire, thinly chartaceous, glabrescent above, minutely pubescent beneath; lateral nerves 10-12 on either half; tertiaries very fine; base rounded or cuneate; petiole 0.1 in. long. *Flowers* .5 in. long, .5 in. across, in densely pubescent terminal panicles. *Calyx* .15-.25 in. long, campanulate, 5-toothed. *Corolla* 2-lipped, .4-.5 in. long, pubescent, glandular without, except at base. *Stamens* exserted; filaments villous at the base. *Ovary* glabrous. *Drupe* .3-.5 in. across, globose, black when ripe and exuding inky juice when cut, depressed at top, enclosed in the enlarged cup-shaped calyx.

SIBSAGAR, NOWGONG, DARRANG, GOALPARA, SYLHET, CACHAR, N. C. HILLS, GARO HILLS, K. & J. HILLS.

Wood yellowish, hard. Timber is used in building works.

Flrs. & Fr. 10-3.

4. *Vitex canescens* Kurz. Vern. *Dieng-sartudkhar*, Khasi; *Than-thang*, Mik.; *Arekdal*, Tipp.; *Panch-pati*, Nep.; *Teta*, Ass.; *Mathokhrai*, Kach.; *Borkeng-thing*, Kuki; *Phung-arong*, Mik.

A deciduous tree (60'/48'') often reaches a girth of 6 ft. *Bark* grey, rough, longitudinally furrowed, about .5 in. thick; inside light cream but soon turning dirty brown; stem

often buttressed; young shoots pubescent. *Leaves* usually 5-foliolate, often 3-5-foliolate; petiole up to 3 in. long. *Leaflets* 2-8 by .8-4 in., lateral gradually smaller, ovate or elliptic, entire, acuminate, chartaceous, scabrid, pubescent and yellowish glandular beneath; base cuneate; petiolule .1-1.3 in. long; the petiolule of the last lateral pairs shortest. *Flowers* dull white in thyrsoid panicles. *Calyx* obscurely toothed, accrescent in fruit. *Corolla* fulvous tomentose outside, conspicuously 2-lipped (middle lobe of lower lip again 3-lobed); lobes with purple veins and dots. *Drupe* .2-.3 in. across, ovoid, ellipsoid or globose.

N. E. F. TRACT, SIBSAGAR, NOWGONG, KAMRUP, DAR-RANG, GOALPARA, SYLHET, N. C. HILLS, GARO HILLS, KHASI HILLS (4,000 ft.).

Flowering usually before the appearance of leaves.

Wood cream-coloured, hard. Leaves are cattle fodder.

Flrs. 4-6. Fr. 6-10.

5. *Vitex quinata* (Lour) F. N. Will.=*V. heterophylla* Roxb. Vern. *Dieng-sart-udkhar*, Khasi; *Ashoi Jahama-ashoi*, Mech.; *Khungsuman*, *Khong-sman-bol*, Garo; *Arekadai*, Tipp.; *Bhatkur*, Sylh.; *Tirale-chiang*, Naga.

A large tree. *Bark* grey, corky, reticulately fissured, .3 in. thick; light dense inside, turning dark greenish brown; branchlets quadrangular, lenticellate. *Leaves* usually 5-foliolate (7-foliolate on coppice shoots); petiole up to 5 in., elliptic or elliptic-oblong, entire, acuminate, membranous, glabrous, gland-dotted; lateral nerves 6-11 on either half; base rounded or cuneate; petiole .2-1.5 in. *Flowers* faintly scented like violets, dull white with veins and dots of deep purple on lip and throat, fading yellow, in large terminal dense flowered paniced cymes. *Calyx* .1 in. long, more or less truncate, glandular, pubescent, accrescent and ribbed in fruit. *Corolla* yellow, gland-dotted. *Stamens* exerted; filaments glabrous. *Drupe* about .2 in. across, globose, sparsely glandular.

N. E. F. TRACT, SYLHET, GOALPARA, N. C. HILLS, GARO HILLS, KHASI HILLS (4,000 ft.).

Wood yellowish.

Flrs. 5-7. Fr. Cold season.

6. *Vitex altissima* Linn. Vern. *Tin-patte*, Nep.; *Anhui*, *Mon-awal*, Sylh.; *Ashoi* or *Jadh-gach*, Jharua; *Inhet-longhing-arong*, Mik.; *Ahoi*, Ass.; *Selong-phang*, Kach.

A large and tall tree (100 ft. high). *Bark* greyish, one inch thick; cream-coloured inside, turning yellowish brown; young shoots villous. *Leaves* 3-foliolate (rarely more); petiole winged up to 4 in. long. *Leaflets* 2·5-8 by ·8-1·8 in.; lateral leaflets lanceolate; middle one lanceolate or oblanceolate, long acuminate, entire; lateral nerves numerous with finely reticulate venation; base acute or cuneate; petiole 0·1 in. long. *Flowers* white tinged with blue or violet, in panicles with spiciform interrupted branches of small grey pubescent cymes; *bracts* small, caducous. *Calyx* ·12 in. long; teeth short, triangular. *Corolla* about ·2 in. long, woolly. *Ovary* fulvous-villous. *Drupe* about ·25 in. across, irregularly globose, purplish, often dotted with white specks supported by the accrescent calyx.

SIBSAGAR, DARRANG, NOWGONG, SYLHET, N. C. HILLS, GARO HILLS (upto 4,000 ft.).

Wood yellowish brown, hard and close grained, valuable for building construction, furniture, carts, boats and oil mill pestles, etc.

Flrs. 4-6. Fr. 7-9.

7. *Vitex limonifolia* Wall.

A tree; shoots hairy or woolly. *Leaves* usually 3-foliolate; leaflets 4-7 by 1·5-3 in., ovate, broad-elliptic or broadly lanceolate, acute, entire or sometimes obscurely sessile, subcoriaceous, pubescent specially along the nerves above, pubescent beneath; lateral nerves 9-13 on either half, subparallel, conspicuous; base acute or cuneate, sessile; common petiole winged, 3-4·5 by ·5-·9 in., wings pubescent beneath. *Inflorescence* terminal thyrsoid pubescent panicles; branches spiciform; bracts persistent. *Calyx* ·5 in. long, pubescent; teeth short. *Corolla* ·25 in. long, villous. *Drupe* globose, ·25 in. across, smooth.

KHASI HILLS (Brandis, April 1879).

(No specimen in Forest Herbarium, Shillong).

Flrs. 5-7. Fr. 9-11.

8. *Vitex vestita* Wall.

A shrub or a small tree; young parts pubescent or woolly with long soft hairs. *Leaves* 3-foliolate. *Leaflets* 2·5 by 1·2·6 in., ovate-lanceolate, entire, acuminate, scaberulous above, softly tomentose beneath; lateral nerves 6-7 on either half, slender; base acute, rounded or cuneate; petiolule ·3-·7 in. long, the petiolule of the middle leaflet being always longest; common petiole 1·5-2 in. long (not winged). *Cymes* axillary, shorter than the petioles; *flowers* whitish. *Calyx* ·12 in. long, almost truncate, pubescent. *Corolla* ·3-·5 in. long, covered with yellowish resinous glands; lobes small. *Anther* cells divaricate. *Drupe* ·25 in. across.

ASSAM, KHASI HILLS (Brandis).

(No specimen in Forest Herbarium, Shillong).

Flrs. 4-5. Fr. 8-10.

9. *Vitex peduncularis* Wall. Vern. *Ashoi*, *Khoidoi*, *Ahui*, *Sila*, *Sila-tita*, Ass.; *Ing-het-lunghin*, Mik.; *Ashoi*, *Rang-ngi*, *Rangri*, *Shilangri*, Garo; *Awal*, Sylh.; *Ashot*, Beng.; *Jadhgach*, Jharua; *Shelong-phang*, Kach.; *Khelrengthing*, Kuki.

A large tree; young shoots pubescent. *Bark* greyish to darkish grey, 1 in. thick, rough, exfoliating in irregular flakes; cream-coloured or dun yellow and mottled inside, turning dirty greenish brown. *Leaves* 3-foliolate (rarely 4); petiole upto 4 in. long, scarcely winged on maturity. *Leaflets* 2-6 by ·7-2 in., lanceolate or narrow-elliptic, entire, long acuminate, membranous, glabrous, minutely yellowish-gland-dotted beneath; lateral nerves numerous, very slender; base acute or cuneate; petiolule ·1-·5 in. long. *Flowers* pale yellow, ·16 in. long, in axillary paniced cymes 6-11 in. long and exceeding the leaves. *Calyx* very minutely toothed, crimson brown, pubescent with golden or light yellow resinous dots. *Corolla* ·1 in. long, yellow near base and hairy with close-set yellow glands. *Stamens* up curved, arching over the throat of the corolla; anthers limb purple after dehiscence. *Drupe* obovoid, about ·4 in. across.

Occurs throughout the Province.

Petiole is winged in coppice shoots. Wood is very hard and the timber is used for posts, oil-mill pestles and yokes, etc.

Flrs. 4-6. Fr. 7-9.

Var. Roxburghiana. Vern. *Ahay*, Ass. *Bark* irregularly pale greenish yellow inside, quickly turning deeper yellowish; petiole winged even on maturity. *Flowers* white with a rather yellow centre.

KAMRUP, NOWGONG, KHASI HILLS.

Infusion of the leaves of both *Vitex peduncularis* proper and its Var. *Roxburghiana* is a valuable specific for Black water fever.

Flrs. 4-6. Fr. 6-8.

10. *Vitex glabrata* Br. Prodr. Vern. *Serlung-baphang*, Kach.; *Pani-amora*, *Bhodia*, *Gohera*, Ass.; *Bandi-kari*, Garo; *Langa-thang-thang*, Mik.; *Kaping-asing*, N.-E. F. Tract.

A long deciduous tree (60'/96"). *Bark* ashy grey, corky, smooth, often vertically fissured; pale yellowish inside soon turning greenish black; stem exaggeratedly fluted and buttressed, often gnarled and covered with round excrescences. *Branchlets* obscurely quadrangular. *Leaves* 5 (—3) foliolate; petiole up to 5 in. long. *Leaflets* 2-7 by 1-3 in., obovate, oblong-elliptic or elliptic-oblong, usually entire, acute or acuminate, coriaceous, glabrous and shining above, finely pubescent beneath; lateral nerves 9-14, subparallel, prominent beneath; petiolules .3-1.5 in. long. *Flowers* .5 in. long, scented, white with a dash of blue, purple or yellow; in dichotomous lax corymbyform pedunculate cymes. *Calyx* .12 in. long, campanulate, enlarged in fruit. *Corolla* pubescent with long hairs on the lower part (and longest) lobe near base. *Drupe* oblong-obovoid, succulent, about .5 by .6 in.

SIBSAGAR, KAMRUP, GOALPARA, SYLHET, N. C. HILLS, KHASI HILLS (upto 2,500 ft.).

Flrs. 4-5. Fr. 7-8.

9. CLERODENDRON Linn.

Shrubs or trees, sometimes straggling, rarely sub-herbaceous. *Leaves* opposite or whorled in 3's or 4's. *Flowers* 5-merous, zygomorphic, usually showy, in axillary cymes or terminal panicles. *Calyx* campanulate, truncate or 5-toothed, or 5-partite; persistent, often accrescent in fruit and brilliant.

ly coloured. *Corolla* tube slender, often long; limb more or less oblique; lobes spreading. *Stamens* 4, exserted, didynamous; filaments filiform. *Ovary* 4-celled. *Stigma* shortly bifid; ovules solitary in each cell. *Drupe* usually succulent, less often dry, somewhat adpressed, 4-lobed or partite, with 1-4 pyrenes or drupels; albumen 0; cotyledons fleshy.

Inflorescence sub-terminal:—

Corolla tube slender 1 in. long. 1. *C. Griffithianum*.
Inflorescence terminal, corymbiform or
 capitate:—

Corolla tube under .75 in. long:—

Leaves entire or serrulate:—

Calyx-segments glandular .5 in. long. 2. *C. infortunatum*.

Leaves entire:—

Calyx-segments glandular, about .25 in.
 long. 3. *C. villosum*.

Corolla tube 1 in. long:—

Leaves nearly glabrous, shallowly cordate. 4. *C. Colebrookianum*.

Leaves pubescent or tomentose, base cuneate or rounded. 5. *C. lasiocephalum*.

Leaves villous or almost woolly beneath; base cordate to cuneate. 6. *C. bracteatum*.

Inflorescence terminal, erect, thyrsus; calyx teeth short, almost truncate:—

Leaves sub-sessile; petiole 0-.5 in.; bracts lanceolate, often whorled. 7. *C. serratum*.

Leaves petiolate; petiole .5-1.5 in.; bracts ovate, leaflike. 8. *C. venosum*.

Inflorescence terminal, erect, lax thyrsus; calyx divided to near the base:—

Leaves with numerous raised glands, truncate, denticulate (not deeply lobed); petiole covered by a dense ring of hairs. 9. *C. squamatum*.

Inflorescence terminal, lax pendulous thyrsus:—

Leaves glabrous, short petioled (petiole .2-.6 in. long); base alternate. 10. *C. nutans*.

Leaves sparsely pubescent, long petioled (upto 6 in. long); base cordate. 11. *C. macrostachyum*.

Inflorescence terminal:—

Corolla tube more than 3 in. long, slender:—

Corolla glabrous:—

Leaves lanceolate, glabrous. 12. *C. Siphonanthus*.

Corolla pubescent:—

Leaves pubescent or villous, hastate. 13. *C. hastatum*.

1. *Clerodendron Griffithianum* Clarke.

A small tree, pubescent. *Bark* greenish white with minute vertical lenticels, .16 in. thick; *blaze* greenish, wood white. *Leaves* 3-8 by 1-2.8 in., oblong, elliptic-lanceolate, caudate-acuminate or acuminate, entire or very obscurely and remotely toothed, membranous, glabrate above, pubescent beneath specially on the nerves; lateral nerves 7-8 on either half; base cuneate or obtuse; petiole pubescent, .3-.8 in. long. *Flowers* white, in lax corymbiform compound pubescent cymes (terminal or sub-terminal). *Calyx* campanulate, pubescent, about 1 in. long, .5 in. across; segments triangular-lanceolate, acuminate, about .6 in. long. *Corolla* white, glabrescent; tube about 1.5 in. long, slender; lobes oblong, .35 in. long. *Drupe* ovoid, .5 by .3 in., enclosed in the enlarged calyx.

LAKHIMPUR, SIBSAGAR.

Flrs. 1-3. Fr. Hot season.

C. fragrans R. Br. Vern. *Phlegi*, Mik.; *Dagorphul*, Ass.

A shrub. *Leaves* 2-6.5 by 1.5-4 in., fœtid when bruised, broadly ovate, puberulous. *Flowers* white, fragrant, turning purplish. *Corolla* double or treble.

A native of China. Cultivated in gardens.

2. *Clerodendron infortunatum* Gærtn. Vern. *Bhet-tita*, *Dhopat-tita*, Ass.; *Phlarik-arong*, *Bikbik*, Mik.; *Syntew-Dohmahi*, *La-ngiar*, *Dieng-Jarem-Synrang*, Khasi; *Bhaint*, Sylh.; *Kuthab*, Manip.; *Juthur*, Tipp.; *Sam-makhi*, *Samsikhs*, Garo; *Bhetu*, Jharua; *Sagainopa*, Kach.; *Reiwang*, Kuki; *Mokhna*, *Lokhona*, Mech.; *Tokolam*, Naga.

A shrub or an undershrub with fœtid smell, often gregarious, forming dense thickets; sometimes covered with large raised lenticular warts; young parts rusty-villous. *Leaves* 3-9 by 3-7 in., broadly ovate, acuminate, subentire or denticulate, pubescent; lateral nerves 6-9 on either half; base rounded or shallow cordate; petiole .5-5 in. long, pubescent. *Flowers* white, tinged pink, fragrant, in large lax terminal pyramidal panicles of cymes; panicles often becoming reddish in fruit. *Bracts* elliptic, acuminate. *Calyx* deeply

5-partite, pubescent .4 in. long in flower, accrescent in fruit, bright red and leathery, .8-1 in. long; segments acuminate. *Corolla* tube slender, .7-.9 in. long, pubescent; lobes elliptic or obovate, .3-.4 in. long. *Stamens* declinate; style much extended. *Drupe* bluish black, at first hidden by the calyx which opens out towards maturity.

Common throughout the Province.

Various parts of the plant are used medicinally. The leaves are tonic and antiperiodic. The fresh juice of the leaves is said to be vermifuge (I.M.P.).

Roots are used for fermenting liquor (Garó Hills).

Flrs. 2-5. Fr. 5-7.

3. *Clerodendron villosum* Bl.

A tall shrub up to 10 ft. high, villous. *Leaves* 4-8 by 3-5 in., ovate-acuminate, chartaceous, tomentose above, more so beneath; lateral nerves 3-5 on either half, base cordate; petiole 1.5-2.5 in. long, tomentose. *Panicles* tomentose, terminal. *Calyx* tube short; segments .3 in. long, tomentose, glandular. *Corolla* whitish, .3 in. long, hairy outside; lobes oblong, glabrescent. *Stamens* exserted. *Drupe* .3 in., black.

NAGA HILLS (4,500 ft.) Brandis P. 507.

(No specimen in Forest Herbarium, Shillong).

Flrs. 11-1. Fr. 3.

4. *Clerodendron Colebrookianum* Walp. Vern. *Dieng-Ja-Kangum*, *Dieng-Ja-Rem-Kynthai*, Khasi; *Bon-bhati*, Sylh.; *Anpui*, Lushai; *Lukhna-buphang*, Mech.

A shrub about 15 ft. high with a globose crown and disagreeable smell. *Bark* shining light grey. *Leaves* 3.5-10 by 2.5-8.5 in., broad-ovate, acute, entire, membranous, almost glabrous; lateral nerves 6-9 on either half; base shallow cordate; petiole .5-6.5 in. long, with cluster of glands near the apex. *Flowers* white in broad terminal compact, corymbiform compound cymes; bract caducous. *Calyx* pubescent, often bearing a few glands; calyx-teeth short. *Corolla* tube slender, 1-1.25 in. long; style exserted. *Fruit* bluish green to deep green when fully ripe, glossy, .3 in. across, globose,

compressed above, of 4 drupels seated on an accrescent cup-shaped calyx about .4 in. across.

SIBSAGAR, NOWGONG, SYLHET, CACHAR, N. C. HILLS, K. & J. HILLS.

Flrs. & Fr. Cold season.

5. *Clerodendron lasiocephalum* Clarke. Vern. *Syntew-domahi*, Khasi.

A shrub 10 ft. high; branchlets pubescent. *Leaves* 3-7 by 2.5-5 in., ovate or elliptic-oblong, dentate, acuminate, membranous, pubescent; lateral nerves 5-7 on either half; base cuneate or rounded; petiole 1-4 in. long. *Flowers* in almost capitate compact cymes. *Calyx* pubescent, .7 in. long, divided nearly to the base; segments-lanceolate, fairly cordate, acuminate. *Corolla* tube slender, upto 1.4 in. long; lobes 5, oblong or obovate, .35 in. long. *Drupe* .3 in. across, red.

KHASI HILLS, MISHMI HILLS.

Flrs. 4-7. Fr. End of rainy season.

6. *Clerodendron bracteatum* Wall. Vern. *Dom-Bhetai*, Ass.; *Mishimiaoguphu*, Kach.; *Anphui-rathol*, Kuki; *Bikbi-kelok*, Mik.; *Dieng-kylasla*, *Dieng-iarem*, *Dieng-rasma*, Synt.

A shrub (25'/15''); young shoots villous. *Bark* ash-coloured, rough, thin; blaze greenish, cream-coloured. *Leaves* 3-8 by 1.5-5 in., ovate, acuminate, entire, membranous, fairly scaberulous above, tomentose beneath; lateral nerves 5-7, oblique, arcuate, lowest pair basal; base truncate or shallow cordate; petiole .5-4 in. long. *Flowers* white, scented, in pedunculate bracteate capitate cymes forming a tomentose corymbiform leafy panicles; bracts ovate or oblong, apiculate, tomentose. *Calyx* membranous, deeply divided; segments ovate-lanceolate. *Corolla* tube slender, pubescent, upto 2 in. long; lobes .5-.6 in., elliptic; anthers purple, turning brown. *Drupe* globose, .3 in. across, bluish purple, seated on an enlarged reddish subcoriaceous calyx.

LAKHIMPUR, SIBSAGAR, DARRANG, CACHAR, N. C. HILLS, K. & J. HILLS (upto 5,500 ft.).

Flrs. 9-11. Fr. 1-3.

7. *Clerodendron serratum* Spreng. Vern. *Beja-oti-asing*, *Pumi-aye*, Miri; *Nangal-bhanga*, Ass.; *Teuri-long-phlang*, Kach.; *Sam-seng*, *Machhok-nachil*, *Samgongol*, Garo; *Hursymet*, *Rilong-phlang*, Khasi; *Phalang-hel Hoh*, Mik.; *Dieng-la-myrsiang*, Synt.

A shrub or an undershrub with woody root-stock upto (5'/15''); young branchlets quadrangular. *Bark* greyish, rough, .25 in. thick; blaze brownish. *Leaves* with a fœtid smell, 2-11 by .8-4.5 in., oblong, oblong-ovate or elliptic-oblong, coarsely serrate, acuminate, coriaceous, often fleshy, glabrescent when mature; lateral nerves 6-8 on either half, arcuate; base narrowed; petiole 0.5 in. long. *Flowers* light red, cymose on the lateral and opposite branches of a terminal elongate pubescent panicle lowest from the axiles of reduced leaves; bracts persistent, pubescent, ovate to lanceolate, .5-1.5 in. long. *Calyx* .3 in. long, pubescent, cupular; teeth very shallow, somewhat accrescent in fruit. *Corolla* tube short, .3 in. long, hairy within; lobes 4, lateral, subequal, ovate-oblong, old lobe longer than the others, darker in colour and concave. *Drupe* black when ripe, .3 in. across, of 1-3 succulent connate drupels.

Common throughout the Province.

The root is used in febrile and catarrhal affections. The leaves are also used as medicine. Young shoots, leaves and flowers are eaten cooked as a vegetable.

Flrs. & Frs. 10-5 (practically all the year round).

8. *Clerodendron venosum* Wall.

A tree (40'/36'). *Bark* pale grey, thin; branches tubercled. *Leaves* 4-7 by 1.5-2.5 in., elliptic-obovate or elliptic, acuminate, entire or distantly serrate, membranous, glabrous above, glabrescent beneath (dull brown on drying); lateral nerves 6-7 on either half; base narrowed into the petiole or acute; petiole .5-1.5 in. long. *Flowers* bluish in erect elongated bracteate pubescent thyrsoid panicles; bracts leafy, ovate, acuminate. *Calyx* .5 in., almost truncate; teeth obscure. *Corolla* bluish with greenish-white tinge.

Drupe succulent, purplish black, seated on a cup-shaped somewhat enlarged calyx.

GOALPARA, KHASI HILLS (upto 4,000 ft.).

Flrs. Hot season. Fr. 8-10.

9. *Clerodendron squamatum* Vahl. Vern. *Dhopatita*, Sibsagar; *Bhandariphul*, Sylh.

A shrub, upto 6 ft. high. *Leaves* 5-10 by 4-9 in., broad ovate or sub-orbicular, acuminate, denticulate, membranous, sparsely scaberulous above, glabrous and gland-dotted beneath; lateral nerves 6-9; base cordate or shallow cordate; petiole .5-10 in. long. *Flowers* in large terminal erect, pyramidal thyrsoïd panicles of which every part is scarlet. *Calyx* divided nearly to the base; segments accrescent in fruit, coriaceous, .3-.6 in. long, scarlet pubescent and glandular towards the apex. *Corolla* tube about 1 in. long, slender; lobes .3-.5 in., scarlet. *Drupe* bluish black, .3-.5 in. across.

SIBSAGAR, NAGA HILLS, SYLHET; also widely cultivated in the gardens.

Flrs. 6-10. Fr. Cold season.

10. *Clerodendron nutans* Wall. Vern. *Dieng-julkoh*, *Mei-soh-randi*, *Hor-randieng*, *Jathang-kaske*, Khasi; *Bonthesa-buphang*, *Mis-mau-jalla-phang*, Kach.; *Uthero*, Manip.; *Baphul-kung*, Tipp.; *Balungre*, Garo; *Tarlong-arong*, *Thainkrokoli-arong*, Mik.; *Dieng-syntew-la-hariam*, Synt.

A shrub about 12 ft. high, glabrous. *Bark* reddish brown. *Leaves* 2-9 by .5-2 in., lanceolate, oblanceolate or elliptic-lanceolate, long, acuminate, entire or sometimes remotely and slightly toothed, membranous, glabrous; lateral nerves 6-7 on either half, slender; base narrowed into a short petiole .2-.7 in. long. *Flowers* white, in lax pendulous thyrsoïd paniced cymes; bracts minute; pedicels slender. *Calyx* deeply divided, greenish; segments valvate, triangular, lanceolate, enlarged in fruit, brick-red; stellately spreading, about .5 in. long. *Corolla* tube white, .5 by .08 in.; lobes spoon-shaped. *Filaments* slender, 1.5 in. long. *Style* rather

shorter than the stamens; stigma minute. *Drupe* succulent, deep purple, .4-.5 in. across, of 1-4 drupels.

SIBSAGAR, NOWGONG, DARRANG, SYLHET, N. C. HILLS, GARO HILLS, GOALPARA, K. & J. HILLS (upto 4,000 ft.).

Flrs. 9-12. Fr. 12-4.

11. *Clerodendron macrostachyum* Turcz.

A rather herbaceous plant, 5-6 ft. high, growing on lime stone. *Leaves* 4-6 by 3-4 in., ovate, dentate, almost lobed, acute, membranous, cordate; petiole upto 6 in. long. *Flowers* pale blue or purple in terminal panicles upto about 11 in. long; pedicels filiform. *Calyx* minute, small. *Corolla* glabrous; lobes .2 in. long, obovate. *Stamens* far exserted. *Style* sub-terminal. *Drupe* .1 in. long, obovoid, covered with red glands ultimately splitting into 4 pyrenes.

KHASI HILLS 2,000 ft. (Wallich).

(No specimen in the Forest Herbarium, Shillong; imperfectly known).

12. *Clerodendron Siphonanthus* Br. Vern. *Akalbih*, Ass.; *Hanmathucho*, *Tarlong-pi-thepo*, Mik.; *Chokphutra*, Sylh.; *Ikhlabir*, Mech.; *Hemla*, Nowgong.

An erect shrub with fluted hollow stem. *Bark* ashy-grey, smooth; blaze greenish. *Leaves* in whorls of 3-6, 3-8.5 by .5-1.5 in., narrow-lanceolate or oblong-lanceolate or linear, entire or serrate, acuminate, chartaceous, glabrous; lateral nerves 6-10 on either half, oblique, usually meeting in a continuous line somewhat inside the margin; base tapering; petiole 0-.2 in. long. *Flowers* handsome, white or cream, 3-5 in. long, drooping on opposite or whorled few flowered cymes forming a large rigid panicle; bracts linear or linear-lanceolate, .5 in. long. *Calyx* deeply partite, green, 4 in. across in flower and .8-1.2 in., in fruit, red; segments oblong or ovate, acuminate. *Corolla* tube very slender, lobes acuminate, .5-.7 in. long, obovate or oblong. *Drupe* bluish or 4 connate drupels, seated on the enlarged calyx.

Common throughout the Province.

The juice expressed from the herbaceous portion is used with

ghee for various skin diseases. Smoke of dried leaves is said to cure cough.

Leaves are eaten by the Mikirs as vegetables.

Flrs. 10-5. Fr. 12-8.

13. Clerodendron hastatum Lindl. Vern. *Dieng-kym-bata-ngiang-mong*, Khasi.

A large shrub; young parts pubescent. *Leaves* 2-7.5 by 1.3-6 in., opposite, often in very unequal pairs, hastate, ovate or oblong, lobed or angled, acute or acuminate, membranous, scaberulous above, softly beneath, specially along the nerves, often purplish beneath; base shallow cordate or hastate; lateral nerves 4-6 on either half, 2 lower from the base; petiole 1.5-5 in long. *Flowers* in dense broad corymbiform terminal panicles; bracts linear, about .6 in long. *Calyx* about 1 in. long, dull greenish white, divided nearly to the base; segments up to .6 in. long, ovate-oblong, acute. *Corolla* tube 4-6 in. long, .1 in across, hairy outside, inflated from points of insertion of filaments; lobes 1-1.25 by .2-.25 in. *Filaments* purple on the exposed half, white in the portion inside the corolla tube. *Drupe* purplish black, succulent, .3-5 in. across, seated on the much accrescent red calyx.

SYLHET, GOALPARA, SIBSAGAR and KHASI HILLS.

Flrs. 5-6. Fr. Cold season.

10. HOLMSKIOLDIA Retz.

Holmskioldia sanguinea Retz. Vern. *Dieng-skorkhnai*, *Jermei-snam-khmut*, *Syntew-nong-smud*, *Mei-da-kyna*, Khasi; *Manu-kata-phul*, Ass.; *Hurmili*, *Arnamamir*, *Wo-so*, *long-i-arong*, Mik.; *Misi-nasil*, Garo; *Khemjuta-phang*, Kach.

A large straggling shrub. *Bark* dark brown or grey, smooth, peeling off in narrow papery strips; branchlets angular pubescent, drooping. *Leaves* 2-1.6 by 1.5-3.5 in., ovate-acuminate, crenate or crenate-serrate, membranous, pubescent; lateral nerves 4-6 on either half; base truncate, subcordate or often abruptly cuneate; petiole .5-1.2 in. long. *Flowers* red, showy (one shrub noticed by Rai Bahadur U. N. Kanjilal with pale green calyx and corolla) in

short axillary and terminal pubescent cymes; bracts small. *Calyx* salver-shaped, scarlet or orange-red, membranous, entire or with an undulate margin .7-1 in. across, persistent and somewhat accrescent in fruit. *Corolla* .6-1 in. long, tube curved, .8 in. long; limb oblique, unequally 5-lobed. *Stamens* didynamous, exserted; anther cells parallel. *Ovary* of two 2-celled carpels with one ovule in each cell; style terminal; stigma shortly bifid. *Fruit* drupaceous, included with the calyx, obovoid, deeply 4-lobed at the apex, nearly dry, separating into 4-1 pyrenes.

Common throughout the Province.

Flrs. 10-12. Fr. End of cold season and hot season.

Recently I have discovered a yellow flowering variety of this species—R. N. De.

11. CARYOPTERIS Bunge.

Caryopteris paniculata Clarke.

A spreading shrub; branches slender, terete, pubescent. *Leaves* 2.7-6 by 1.2-1 in., elliptic-acuminate, toothed, coriaceous, punctate with yellow glands, glabrate when mature; base obtuse or rounded; petiole .2-.3 in. *Flowers* violet or lilac (Brandis) in small subsessile dense-flowered thyrsoid panicle. *Calyx* deeply 5-fid, scarcely accrescent in fruit; segments 5-7 in. long, acuminate. *Corolla* pubescent; tube short, cylindric, about .16 in. long; lobes 5, imbricate in bud, 4 equal, the 5th lower, longer. *Stamens* exserted; anther-cells divergent at base. *Ovary* imperfectly 4-celled, 4-ovuled; style filiform, shortly 2-fid. *Capsule* dividing into 4 valves with incurved margins holding the 4 one-seeded slightly winged pyrenes.

N. E. F. TRACT, MANIPUR, LUSHAI HILLS, MISHMI HILLS.

Flrs. & Fr. 12-4.

C. Wallichiana Schau.

A large spreading shrub; bark brownish, peeling off in narrow papery strips; branchlets quadrangular, pubescent. *Leaves* 2-5 by 1-1.5 in., lanceolate, narrow-elliptic, crenate-serrate or sub-entire, acuminate, puberulous; lateral nerves 4-5 on either half; base cuneate; petiole .3-.5 in. long, formed by an interpetiolar line. *Flowers* slightly fragrant, light-mauve or light-blue, .5 in. across in cymes forming terminal thyrsoid panicle; lower cymes axillary; bracts minute. *Calyx* .15 in.

long, 5-fid; segments linear-lanceolate, somewhat ribbed, erect and slightly enlarged in fruit. *Corolla* 2-lipped; tube $\cdot 2\cdot 3$ long, shorter than the lobes; middle lobe of lower lips deeper coloured (bluish), others pale whitish and shorter. *Stamens* didynamous, exserted; anthers confluent. *Ovary* 4-celled with one pendulous ovule in each cell; style exserted. *Fruit* $\cdot 2$ in. long, capsular, globose, pubescent, separating into concave valves with one seed in each.

Flrs. 2-4. Fr. 5-7.

12. SPHENODESMA Jack.

Scandent large shrubs. *Leaves* opposite, entire. *Flowers* sessile in pedunculate capitate 3-7-flowered cymes enclosed in an involucre of 6 foliaceous accrescent bracts, arranged in panicles. *Calyx* ovoid, campanulate, 5-toothed (rarely 4 or 6.) *Corolla* more or less zygomorphic; tube short, cylindric; lobes 5, rarely 6, subequal, imbricate in bud. *Stamens* 5, as a rule included; anthers oblong or reniform, parallel or divergent. *Ovary* 2-celled; ovules 2 in each cell, pendulous from the apex of the axile placenta; style short or long; stigma 2-lobed. *Drupe* obovoid or globose, included in the calyx, 1-(rarely 2) seeded; cotyledons fleshy; radicle inferior.

Style obsolete; hairs stellate:—

Anthers undivided:—

Involucre bracts-obtuse, lanceolate or
oblanceolate. Ovary glabrous. .. 1. *S. unguiculata*.

Style filiform, long; hairs not stellate:—

Anthers exserted:—

Involucre bracts linear-oblong. Ovary
densely villous. 2. *S. pentandra*.

1. *Sphenodesma unguiculata* Schauer.

A large deciduous climber with twisted stem; young parts and inflorescence stellate-pubescent or tomentose. *Leaves* 3-7 by $1\cdot 5\cdot 3$ in., ovate-elliptic or oblong-elliptic, acuminate or acute, entire, coriaceous, glabrous when mature, sparsely stellate, hairy when young; lateral nerves 4-7 on either half, impressed above, more conspicuous beneath; base rounded or subacute; petiole $\cdot 3\cdot 6$ in. long. *Flowers* cream-coloured, sessile in involucre heads usually arranged in terminal panicles; bracts 6, much enlarged in fruit, spatulate, elliptic or oblanceolate, membranous, prominently

veined (1·5 by ·6 in.). *Calyx* stellate-tomentose, obconic; teeth usually 5. *Corolla* lobes (5-6), obovate or oblong. ·12·16 in. long. *Stamens* 5, included. *Ovary* glabrous, imperfectly 2-celled; ovules 4, pendulous; stigma sessile, bifid. *Drupe* ovoid, glabrous, glandular at the apex.

N.-E. F. TRACT, KHASI HILLS, NAGA HILLS, CACHAR.

Flrs. 12-1. Fr. 2-3.

2. *Sphenodesma pentandra* Jack. Vern. *Tukha-karaing*, Kach.; *Baking-rap-rikang*, *Arkeng-ke-et*, Mik.

A large woody climber; branchlets obscurely 4-angled, lenticellate, rusty pubescent. *Leaves* 2-6 by 1-1·5 in., elliptic-oblong, ovate, ovate-lanceolate, acuminate or acute, occasionally mucronate, sub-coriaceous, glossy green above, paler beneath and pubescent when young, both surfaces glabrous when mature; lateral nerves 4-7 on either half, arcuate, oblique; base rounded; petiole ·2·4 in. long, channelled, pubescent. *Flowers* ·5 in. across, delightfully fragrant in axillary or terminal panicles, somewhat pubescent, the involucrate heads are in opposite pairs or often subtended by a leaf-like bract; bracts linear, oblong, almost glabrous, enlarged to about 1 in. in fruit. *Calyx* funnel-shaped, almost glabrous, 5-toothed, 10-ribbed, mouth inflated in fruit with 5 accessory teeth. *Corolla* purplish, glabrate without, densely villous within. *Anthers* exserted. *Ovary* densely villous; style very long, slender. *Drupe* size of a pea, 1-seeded.

N. E. F. TRACT, NOWGONG, SIBSAGAR, CACHAR, GARO HILLS, MANIPUR, NAGA HILLS, SYLHET, KHASI HILLS.

Flrs. 12. Fr. 4.

***Phryma leptostachya* Linn.**

A small erect herb. *Leaves* 1·5-3 by ·5-1·2 in., ovate or ovate-lanceolate, acuminate, dentate-crenate, membranous, whitish grey and thinly pubescent on the nerves beneath; base cuneate; petiole ·5-1 in. long. *Flowers* pale pink in alternate long slender racemes. *Calyx* tubular; teeth 3-linear, hooked; *Corolla* bilabiate; lower lip or 3 rounded patent lobes. *Stamens* 4-didynamous. *Ovary* oblong-oblique. *Urticle* membranous, oblong, 3 in. long.

KHASI HILLS, (4,000-6,000 feet).

Flrs. and Fr. 8-9.

FAM. 101. LABIATÆ.

(J. D. Hooker.)

Herbs or undershrubs, rarely shrub, often aromatic due to essential oils secreted in various forms of glandular hairs, stems usually quadrangular. *Leaves* simple, opposite or whorled, exstipulate. *Flowers* more or less zygomorphic, hermaphrodite, solitary or in pairs or fascicled and axillary or in centrifugal cymes forming false whorls; bracts and bracteoles usually small. *Calyx* inferior, persistent, more or less tubular, 4-5-fid, often distinctly 2-lipped. *Corolla* hypogynous with tubular base, 4-5-lobed or bilabiate; lobes imbricate in bud. *Stamens* inserted on the corolla 4, usually didynamous or only 2, perfect; anther-cells connate, separate or confluent, dehiscing longitudinally. *Disc* prominent. *Ovary* superior, 4-lobed or partite; style slender, simple, from the centre of the ovary between the lobes; stigma usually bifid, sometimes subequally; style mostly gynobasic, arising from the inner base of the lobes; ovules anatropous. *Fruit* of 4 usually dry, 1-seeded nutlets, sometimes 1 or more suppressed. *Seeds* erect; albumen scanty or 0: radicle inferior.

Ovary 4-partite. Nutlets with basal or dorso-basal areole :—

A. Nutlets dry :—

Stamens 4, declinate; anther-cells confluent :—

Lower lip of corolla declinate, flat or nearly so :—

Fruiting calyx deflexed, upper teeth large, ovate, recurved, decurrent :—

Corolla tube short, lower lip flat, stigma 2-fid.

1. **Ocimum.**

Corolla tube usually long, lower lip concave, stigma entire.

2. **Orthosiphon.**

Fruiting calyx declinate, 2-lipped, upper filaments toothed.

3. **Mesona.**

Fruiting calyx suberect not transversely pitted or ribbed :—

Flowers in capitate globose or ovoid whorls.

4. **Acrocephalus.**

Fruiting calyx suberect or declinate,
transversely pitted or ribbed :—

Flowers in simple raceme. .. 5. **Geniosporum.**
Lower lip of corolla concave, boat-shaped
or saccate, much longer than the upper
lip :—

Filaments free :—

Calyx oblique, 2-lipped, upper lip
usually deflexed on the mouth in
fruit :—

Flowers in spikes. .. 6. **Anisochilus.**

Calyx equally 5-toothed or obscurely
bilabiate :—

Flowers in whorls or lax cymes. .. 7. **Plectranthus.**

Filaments connate. .. 8. **Coleus.**

Stamens not declinate; anthers 1- 2- celled :—

1. Stamens suberect, dumping and distant :—

Stamens 4, perfect :—

Corolla lobes flat; anther 1-celled :—

Calyx 5-toothed :—

Corolla sub-bilabiate. .. 9. **Pogostemon.**

Corolla sub-equally 4-lobed. .. 10. **Dysophylla.**

Stamens 4, perfect; anthers 2-celled :—

Filaments not bended :—

Fruiting calyx erect, elongate. .. 11. **Elsholtzia.**

Fruiting calyx declinate, bilabiate. 12. **Perilla.**

Fruiting calyx 10-nerved, 5-toothed. 13. **Mentha.**

Stamens perfect 2, anthers 2-celled. .. 14. **Mosla.**

Corolla bilabiate. Calyx 13-nerved :—

Calyx 2-lipped. Corolla tube nearly
straight :—

Stamens 4 or 2, upper imperfect. 15. **Calamintha.**

Calyx 2-lipped. Corolla tube curv-
ed :—

Stamens 4, perfect. .. 16. **Melissa.**

Stamens 2, perfect :—

Corolla 4-lobed, anther-cells 2, equal,
pendulous from a long connective. .. 17. **Meriandra.**

Corolla 2-lipped; anther very unequal
or solitary on a long connective. .. 18. **Salvia.**

Stamens 4, perfect, lower pair longest :—

Upper lip of corolla hooded, not
woolly :—

Calyx 2-lipped, mouth elongated
after flowering; upper lip of calyx
with a broad plate. .. 19. **Scutellaria.**

Calyx tubular, upper lip 3- or 2-
toothed. .. 20. **Brunella.**

Upper lip of corolla short :—

Calyx tubular or campanulate :—

Anther-cells divaricate, nutlets
subglobose. 21. **Craniotome.**

Anther-cells of lower stamens
parallel, transverse or upper
dentate. 22. **Anisomeles.**

Anther-cells confluent; nutlets
winged. 23. **Colquhounia.**

Upper lip of corolla hooded, vill-
ous :—

Calyx 5-toothed, spinescent :—

Stamens more or less exserted;
anther-cells parallel. 24. **Leonurus.**

Calyx 8- or 10- toothed :—

Stamens included; anther-cells
divergent :—

Lower lip of corolla longer
than the hood. 25. **Leucas.**

B. Nutlets succulent. Corolla bilabiate, the
upper lip hooded, anther-cells parallel, the
interior pair of stamens longer :—

Calyx 5-toothed. Corolla tube
slender, throat broad. 26. **Gomphostemma.**

2. Stamens ascending :—

Stamens 4, perfect :—

Ovary 4-lobed, with a large oblique
or ventral anthers :—

Upper corolla tip very short.
Stamens very long, stringent, di-
vergent. 27. **Leucosceptrum.**

Upper corolla very short, 2-fid
with the incurved stamens ex-
serted from the cleft. 28. **Teucrium.**

1. OCIMUM Linn.

Strongly aromatic herbs, undershrubs or shrubs. *Leaves* opposite or whorled, pitted with numerous minute glands. *Flowers* small, purplish or white in 6-10-flowered whorls in terminal spikes or racemes, sometimes paniced; pedicel-tips recurved; bracts small, caducous. *Calyx* ovoid or campanulate, deflexed in fruit, 2-lipped; upper lip broad, flat, decurrent; lower lip with 4 mucronate teeth, the 2 middle ones usually the largest. *Corolla* bilabiate; tube short not annulate within, upper lip sub-equally 4-fid, lower lip entire, declinate, hardly longer than the upper. *Stamens* 4, didyna-

mous, declinate, exserted; filaments free or the lower pair connate below, naked, the upper often toothed or hairy below; anther-cells confluent. *Disc* entire or 3-4-lobed. *Ovary* 4-partite; style gynobasic; lobes subulate or flattened; stigma bifid. *Fruit* of 4 dry nutlets, smooth or sub-rugose, more or less mucilaginous when moistened.

Two lower calyx teeth longer than the upper lip :—

Pedicels as long or longer than the calyx.

Nutlets not mucilaginous when wetted :—

Fruiting calyx glabrous within. .. 1. *O. sanctum*.

Pedicels shorter than the calyx. Nutlets mucilaginous when moistened :—

Corolla .15-.2 in. long :—

Fruiting calyx villous within. .. 2. *O. canum*.

Corolla .3-.5 in. long :—

Fruiting calyx large, hairy or glabrous. 3. *O. Basilicum*.

1. *Ocimum sanctum* Linn. The sacred Basil. Vern. *Tulsi*.

A perennial with woody root-stock; branchlets purplish, softly hirsute or pubescent. *Leaves* 1-2 by .5-1 in., ovate or ovate-oblong or elliptic-oblong, distantly serrate, crenate or entire, acute, membranous, pubescent; base acute; petiole .1-.3 in. *Flowers* 1.8-2 in. long, purplish or crimson in racemed, often paniced whorls upto 8 in. long; pedicels usually longer than the calyx; bracts reflexed. *Calyx* glabrous within, glandular and pubescent without, enlarged in fruit; upper lip obovate and acute at the base in fruit, shorter than the lower lip. *Corolla* .15 in. long, upper lip hairy on the back; filaments of the upper stamens bearded at the base. *Nutlets* reddish with black markings .05 in. long, ellipsoid.

Cultivated throughout the Province. It is the sacred plant of the Hindus. The leaves are medicinally efficacious and are much used for catarrh and other pulmonary affections. The stems are made into rosaries and worn largely by *Vaishnavas*.

The plant is reputed to keep off mosquitoes. (*I.M.P.*).

Flrs. and Fr. Rainy season to cold season.

2. *Ocimum canum* Sims. The hoary Basil.

An erect very pubescent undershrub. *Leaves* .5-1.5 in., elliptic or elliptic-lanceolate, glandular, glabrate on maturity.

Flowers white or pale purple. *Calyx* densely villous inside, upper lip in fruit sub-orbicular, shorter than the teeth of the lower lip. *Nutlets* .05 in. long, black when ripe.

SYLHET. Cultivated.

The seeds become very mucilaginous in water. The leaves are made into a paste and are applied to finger and toes for resting warmth, when the extremities become cold during fever. (I.M.P.).

Flrs. & Fr. 8-3.

3. *Ocimum Basilicum* Linn. Var. *purpurascens*. The Sweet Basil. Vern. *Tew-la-pong-nai*, Khasi.

A slender much scented and much branched herb, generally purple coloured; stems glabrous or more or less pubescent, hairy at the nodes. *Leaves* .5-1.5 by .2-5 in., ovate, acute, entire or more or less lobed or toothed, glandular; petiole .5 in. long. *Flowers* pale purple in nearly single racemes; pedicels shorter than the calyx, much deflexed in fruit, upper lip of calyx rounded, shorter than the teeth of the lower lip. *Nutlets* .07 in. across, ellipsoid, black, slightly pitted and become very gelatinous in water.

KHASI HILLS. Cultivated.

The leafy tops which have a fragrant taste are often used as a seasoning for culinary purposes. The leaves are used in the treatment of bronchitis. The expressed juice is said to cure ring-worm, and an application of bruised leaves relieves pain from scorpion stings. They are used in catarrh, chronic diarrhœa, dysentery, nephritis and in several other ailments.

Flrs. & Fr. 9-3.

2. ORTHOSIPHON Benth.

Aromatic shrubs, undershrubs or herbs with woody root-stock or tuberous roots. *Flowers* in whorls of 6 or fewer flowered in terminal raceme. *Calyx* ovoid, campanulate, deflexed in fruit; the upper lip broad, membranous with decurrent margins. *Corolla* bilabiate, sometimes very long; upper lip sub-equally 4-lobed; lower entire, concave, declinate. *Stamens* 4, didynamous, declinate, glabrous; filaments free without appendages at the base; anther-cells confluent. *Disk*

usually gibbous; stigma capitate or clavate. *Fruit* of 4 nutlets, ovoid, globose or ellipsoid, usually smooth.

Stamens included :—

Calyx throat not villous within :—

Petiole upto 1·5 in. long. 1. *O. incurvus*.

Petiole upto ·75 in. long. 2. *O. robustus*.

Stamens far exerted :—

Calyx throat not villous within. Filaments
conspicuously long, filiform. 3. *O. aristatus*.

1. *Orthosiphon incurvus* Benth.

An erect rarely branched herb with tuberous roots. *Leaves* ·15-4 by ·7-2·3 in., ovate or ovate-lanceolate, coarsely crenate, acute, or acuminate. *Fruiting* calyx ·3-·5 in. long, lower lip curved. *Corolla* purplish.

KHASI HILLS (4,000 ft.).

Flrs. 6-8. Fr. Cold season.

2. *Orthosiphon robustus* Hook. f.

A robust finely pubescent herb. The whole plant when dried becomes dark rusty colour clothed uniformly with fine pubescence (*F. B. I.*).

DUFFLA HILLS.

Flrs. 2. Fr. Hot season.

3. *Orthosiphon aristatus* (Bl) Miq.=*O. stamineus* Benth.

An erect pretty herb about 4 ft.; stem quadrangular. *Leaves* 2-9 in. long, ovate-acuminate, coarsely toothed. *Flowers* lilac or light purplish blue. *Fruiting* calyx campanulate. *Corolla* ·5-·75 in. long, puberulous; upper lip 4-lobed. *Stamens* filiform, very long, much longer than the corolla lobes; filaments long. *Nutlets* ellipsoid, compressed, rugose.

MANIPUR, NAGA HILLS.

In Java, the leaves are made into tea and used in the treatment of diseases of the kidneys and bladder. In Holland and France, they have been used successfully in the treatment of diseases of urinary organs (*I.M.P.*).

Flrs. 8-10. Fr. Cold season.

Orthosiphon glandulosus C. E. C. Fischer. Kew Bulletin 1930. P. 240.

An undershrub; stems obtusely quadrangular, sulcate when dry. *Leaves* 4·5-9 by 3-6 in., broadly ovate, cauline acuminate with scattered stiff whitish multi-cellular hairs above, dotted with yellowish glands on both faces, pale beneath, primary nerves 5-7 pairs, ascending, arched; margins broadly apiculate, dentate; base shortly cuneate or the smaller ones sub-cordate; petioles 15-4 in., glabrous. *Scape* upto 12 in.; rachis obtusely quadrangular, 4-sulcate, more or less densely furfuraceous brown, hairy; bracts ovate-cordate, nearly glabrous, 3 in. long. *Flowers* white in whorls of 4 or 6; pedicels brown furfuraceous, 17-2 in. long. *Calyx* narrowly campanulate, membranous, 3-4 in. long, furfuraceous hairy near the base and on the nerves, dotted outside with glistening yellowish glands; upper lobe orbicular, rounded or very shortly acute, shorter than the tube; later and lower lobes narrow and awned; the lowest longest, minutely hispid. *Corolla* minutely puberulous without; tube 66 in. long, very slender, rarely cylindric; lobes rounded, upto 5 in. long; lower entire; upper 3-fid. *Stamens* inserted near the mouth of the corolla tube; filaments capillary, mauve, upto 3 in. long; anthers very small. *Disc* glabrous, shallowly lobed. *Ovary* glabrous; style filiform as far exerted as the stamens or slightly further, glabrous; stigma 66 in. long, upper lobe slightly convex, nerves prominent. *Nutlets* ellipsoid, slightly compressed, slightly narrowed to the base; 12-17 in. long, brown; testa raised, reticulate.

LUSHAI HILLS (3,000 ft.).

Flrs. 7-8.

O. Wattii Prain.

Stem leafy, puberulous, 4-angled. *Leaves* decussately paired, irregularly cordate, acutely lobed, sub-acuminate, thick, sparsely puberulous above. *Racemes* simple; bracts broadly cordate, acuminate. *Calyx* campanulate, puberulous; 2 lower teeth subulate. *Corolla* tube slender; lower lip concave; upper 3-fid. *Filaments* naked.

ASSAM, MANIPUR, NAGA HILLS.

3. MESONA Blume.

Mesona Wallichiana Benth.

An aromatic annual; stem hairy at the nodes. *Leaves* 5-1·5 by 2-5 in., ovate or narrow-lanceolate, acute, serrate, membranous, narrowed into a short petiole 2-6 in. long. *Flowers* small in many flowered racemed whorls. *Fruiting*

calyx declinate, bilabiate. *Stamens* 4; filaments exserted, upper filaments toothed. *Nutlets* ellipsoid.

KHASI HILLS (4,000 ft.).

Flrs. 10. Fr. Cold season.

4. ACROCEPHALUS Benth.

Acrocephalus indicus (*Burm. f.*) *O. Ktze.* = *A. capitatus* Benth & *Acrocephalus axillaris* Benth.

Two annuals with whorls of small flowers in dense heads with imbricate bracts and filaments included; also occur in the regions of the Flora.

5. GENIOSPORUM Wall.

Geniosporum strobiliferum *Wall.* Vern. *Bon-Tulsi*, Ass.

Shrubby, 5-7 ft. high; stem -puberulous, obscurely quadrangular. *Leaves* 1-4 by .3-1.2 in., (not aromatic), ovate-lanceolate, serrate, acuminate or acute, membranous, puberulous; base cuneate; petiole .2-.5 in. long. *Flowers* small, white in dense spikes; bracts whitish. *Fruiting calyx* erect, pubescent; upper lip with 2 glands; throat glabrous. *Corolla* with purplish veins. *Nutlets* ellipsoid, black, hairy at the apex.

KHASI HILLS, KAMRUP.

Flrs. & Fr. 4-10.

6. ANISOCHILUS Wall.

Herbs or undershrubs, often fleshy. *Flowers* small, in dense spicate whorls. *Calyx* very oblique, inflated below the middle, suberect, usually bilabiate or 5-toothed; upper lip entire and deflexed. *Corolla* bilabiate; tube slender, inflated above and recurved. *Stamens* 4, declinate, didynamous; filaments free; anther-cells confluent. *Disc* lobed. *Ovary* 4-partite; style bifid. *Fruit* of 4 dry nutlets; basal scar small.

Anisochilus pallidus *Wall.*

A tall branched puberulous annual. *Leaves* 1.5-7 in. long, long-petioled, ovate-lanceolate, acuminate, dentate, membranous. *Spikes*:

panicled. *Fruiting* calyx tomentose like a "cat's claw" (F.B.I.) recurved beak of upper lip closing the mouth.

KHASI HILLS.

Flrs. 4.

Anisochilus polystachyus Benth.

A rigid robust herb; stem strict hoary. *Leaves* 1·5-6 in., subsessile, lanceolate, acuminate, serrate, membranous. *Spikes* panicled. *Fruiting* calyx tomentose slit in front; mouth very oblique; not quite closed by the 5-toothed recurved lip.

KHASI HILLS.

Flrs. 4.

Microtœna cymosa Prain. Syn. *M. insuavis* Dunn.

Leaves 1·2·5 by ·5-1·8 in., ovate or ovate-lanceolate, shortly acuminate or acute, serrate, membranous, hairy on both surfaces. *Flowers* in paniculate cymes. *Calyx* hairy outside. *Corolla* ·6 in. long, bilabiate.

KHASI HILLS, MANIPUR.

Smells very slightly of Patchauli (oil and perfume), which is also obtainable from the plant.

Flrs. 11. Fr. 7.

7. PLECTRANTHUS L'Herit.

Herbs or undershrubs; stem usually more or less quadrangular. *Leaves* opposite or terete. *Flowers* small, in panicled or racemose 6-8 flowered cymes or whorls. *Calyx* 2-lipped, 5-toothed, enlarged in fruit. *Corolla* 2-lipped; tube exserted, long or short, straight or recurved; limb equal or gibbous; upper lip usually short, 4-fid, recurved; the lower much longer, entire, boat-shaped, narrow or stipitate at the base. *Stamens* 4, declinate, didynamous; filaments free; anther-cells usually confluent. *Disc* large, usually produced in front. *Ovary* 4-partite; style slender, subequal, 2-fid. *Fruit* of 4 orbicular, ovoid or oblong, granulate or punctate nutlets; basal scar small.

Fruiting calyx broad, deeply bilabiate; upper lip with 3 distinct spines; lower lip of 2 long subulate teeth :—

Stamens sparsely hairy. *Leaves* ovate-lanceolate.

1. *P. macranthus*.

Fruiting calyx indistinctly bilabiate. Calyx teeth subequal and similar. Leaves opposite :—

Fruiting calyx glabrous or nearly so :—

Corolla white; upper lip spotted. .. 2. *P. Gerardianus*.

Fruiting calyx hispid :—

Corolla white. .. 3. *P. striatus*.

Fruiting calyx minute, densely woolly :—

Corolla white, speckled with red. .. 4. *P. hispidus*.

Fruiting calyx narrow, bilabiate; teeth acute :—

Fruiting calyx scaberulous :—

Corolla recurved, lavender-blue. .. 5. *P. Coetsa*.

Fruiting calyx sub-hispid :—

Corolla gibbously hemispheric. .. 6. *P. melissoides*.

Fruiting calyx 2-lipped; upper lip large :—

Stem hoary; upper calyx segments broadly ovate. .. 7. *P. incanus*.

Stem hirsutely tomentose :—

Nutlets black, shining. .. 8. *P. Griffithii*.

Stem finely tomentose (not hirsute) :—

Nutlets black, granulate, opaque. .. 9. *P. crenulatus*.

Fruiting calyx equally 5-toothed :—

Corolla base gibbous :—

Leaves usually ternately whorled. .. 10. *P. ternifolius*.

1. *Plectranthus macranthus* Hook. f.

A sparsely hairy perennial, shrubby, 6-12 in. in height. *Leaves* 2-4 by .8-1.2 in., ovate-lanceolate or elliptic-lanceolate, coarsely serrate, membranous, acute; base acute or cuneate; petiole .2-.3 in. long. *Flowers* in racemes. *Corolla* about 1 in. long, tube straight. *Nutlets* globose.

KHASI HILLS (5,000 ft.).

Flrs. 8.

P. scrophularoides Wall. A straggling shrub. Flowers white.

NAGA HILLS, 1,500 M. (Bor. 6.514).

Flrs. 9.

2. *Plectranthus Gerardianus* Benth.

An almost glabrous branched perennial. *Leaves* 2-6 by 1.2-5 in., ovate or ovate-lanceolate, acuminate, crenate or toothed, membranous, tough, sparsely hairy, lower surface gland-dotted; base narrowed into a short petiole .1-.2 in.

long. *Flowers* in paniced cymes. *Calyx* gland-dotted. *Nutlets* ellipsoid.

KHASI HILLS (6,000 ft.).

Flrs. 10. Fr. Cold season.

Var. graciliflora Benth. Shrubby, about 5 ft. high; stem 4-gonous, reddish brown. *Leaves* conspicuously scabrid above, drying red-brown.

KHASI HILLS.

Flrs. 10. Fr. Cold season.

3. *Plectranthus striatus Benth.*

A pubescent or hairy shrubby, perennial. *Leaves* 1-4 by .5-2 in., ovate, crenate, acuminate, membranous, scaberulous. *Flowers* in paniced cymes. *Calyx* hispid, enlarged and recurved in fruit. *Corolla* white, longer than the calyx. *Nutlets* oblong.

KHASI HILLS (6,000 ft.).

Flrs. 10. Fr. Cold season.

4. *Plectranthus hispidus Benth.*

A stout erect perennial, shrubby, scaberulous, densely woolly. *Calyx* woolly. *Nutlets* very minute, ellipsoid.

KHASI HILLS (3-4,000 ft.).

Flrs. & Fr. 9-11.

5. *Plectranthus Coetsa Ham.*

A tall erect strongly, aromatic pubescent perennial, shrubby. *Leaves* 1-3 by .5-1.5 in., ovate or ovate-lanceolate, crenate or sharply dentate, acuminate, membranous, sparsely puberulous; petiole up to 1 in. long. *Flowers* lavender-blue in paniculate cymes. *Calyx* hispid, enlarged and recurved in fruit.

KHASI HILLS.

Flrs. 1. Fr. Hot season.

6. *Plectranthus melissoides Benth.*

A tomentose erect herb. *Leaves* .5-1.5 in., ovate, crenate, membranous, hairy on both surfaces, specially along

the nerves. *Flowers* pinkish, on laxly flowered racemose cymes. *Fruiting calyx* hairy.

KHASI HILLS (6,000 ft.).

Flrs. & Fr. 8.

7. *Plectranthus incanus* Link.

A hoary pubescent herb. *Leaves* 2·4 by 1·75-3·5 in., ovate-cordate, velvety, acute, gland-dotted beneath, crenate; petiole upto 4 in. long. *Flowers* pale lilac or light blue. *Calyx* enlarged in fruit; lower lip with 4 subulate teeth. *Nutlets* ·09 in. across, spotted, sub-globose, grey-brown.

KHASI HILLS.

Flrs. 8-10. Fr. Cold season.

8. *Plectranthus Griffithii* Hook. f.

An erect hirsutely tomentose annual; shrubby; stem woody. *Leaves* 3-5 in., ovate-acuminate, crenate or dentate, long-acuminate, hirsutely tomentose; base rounded or cordate; petiole upto 1·5 in. long. *Flowers* in slender racemose cymes. *Fruiting calyx* sparsely hairy; lips subequal. *Corolla* tube declinate; lips subequal. *Nutlets* black, shining, orbicular.

N.-E. F. TRACT.

Flrs. & Fr. Cold season.

9. *Plectranthus crenulatus* Hook. f.

An erect finely tomentose woody perennial. *Leaves* ovate-acute, crenulate. *Flowers* in axillary racemose cymes. *Fruiting calyx* hairy. *Nutlets* orbicular, black, granulate, opaque.

LAKHIMPUR (Kamrup).

10. *Plectranthus ternifolius* Don. Vern. *Mirna-koutung-asing*, Miri; *Ja-ram-reu*, Khasi.

A robust, densely tomentose undershrub. *Leaves* 2-6 by ·5-1·5 in., ternately whorled, subsessile, lanceolate-acuminate, serrate, coriaceous, rugose above, densely tomentose.

Flowers in dense cymose whorls on densely tomentose paniced spikes. *Fruiting* calyx subequally toothed. *Corolla* white, spotted pink on the upper lip, gibbous above the base; tube recurved. *Nutlets* acuminate, 3-gonous, ovoid-oblong.

N. E. F. TRACT, DARRANG, KAMRUP, KHASI HILLS.

Flrs. 9-11. Fr. 1-3.

8. COLEUS Lour.

Coleus Blumei Benth.—is commonly cultivated. The leaves are mottled with deep purple or sanguine. *Stamens* 1 (Bot. Mag. 4754). A form of above is found gregarious occurring in N. E. F. Tract (Kanjilal No. 3217). *Leaves* .5-1 in. by .4-1 in., ovate or orbicular, coarsely and obtusely crenate with brown blotches. *Hood* of corolla teeth with orange dots outside.

Flrs. 4-5.

9. POGOSTEMON Desf.

Herbs or shrubs, often aromatic. *Flowers* small, in whorls or cymes, arranged in spikes or racemes. *Calyx* subequally 4-5-toothed. *Corolla* tube exserted or included, sub-2-lipped; the upper lip 3-lobed; the lower narrow and longer. *Stamens* 4, exserted, straight or declinate; filaments usually bearded; anther-cells confluent. *Disc* subentire; style bifid. *Nutlets* ovoid or ellipsoid.

Whorls forming continuous spikes :—

Stem villous or hoary pubescent :—

Bracts glandular exceeding the calyx :—

Calyx teeth short, triangular, lanceolate.

1. *P. plectranthoides*.

Bracts falcate equalling the calyx :—

Calyx teeth as long as the tube, subulate.

2. *P. purpurascens*.

Bracts ovate, equalling the villous calyx :—

Calyx teeth shortly lanceolate.

3. *P. villosus*.

Stem scaberulous or glabrate :—

Bracts elliptic-ovate, exceeding the purplish calyx :—

Calyx teeth short, triangular, lanceolate, ciliate.

4. *P. parviflorus*.

Stem laxly hairy, flexuous:—

Bracts obliquely ovate, sub-orbicular, membranous, imbricate:—

Calyx teeth lanceolate, ciliate. .. 5. *P. paniculatus*.

Whorls usually distant, forming interrupted spikes:—

Stem.—young parts tomentose:—

Calyx small, hoary; teeth sub-acute, not ciliate. Corolla purple. .. 6. *P. elsholtzioides*.

1. *Pogostemon plectranthoides* Desf. Vern. *Bakoha*, Beng.

A large branching aromatic shrub; branches often dark purple; young parts hoary pubescent. *Leaves* 2-6 by 1-3 in., ovate or ovate-lanceolate, acute or acuminate, doubly serrate, rather subcoriaceous, sometimes pubescent, generally glabrescent; lateral nerves 3-6 on either half, oblique, arcuate, prominent beneath; base rounded or cuneate; petiole 1-3 in. long. *Flowers* white or pale pinkish, in capitate whorls or pubescent paniced terminal and axillary spikes. *Bracts* foliaceous, ovate-acuminate, glandular, exceeding the flower-buds, usually tinged pinkish, villous. *Calyx* glandular hairy, .15-2 in. long; teeth shorter than the tube. *Corolla* about .2 in. long. *Stamens* bearded with light purple jointed hairs. *Nutlets* minute, dark-brown, compressed and polished when ripe.

GOALPARA.

Used as a fence by Mech. and Rajbangshis, medicinal uses similar to that of *P. parviflorus*.

Flrs. 2. Fr. Hot season.

2. *Pogostemon purpurascens* Dalz.

An erect branched herb. *Leaves* 2·7 by 1·3·5 in., ovate-acute, doubly serrate, softly hairy on both sides. *Calyx* teeth as long as the tube, upper lip of corolla purplish. *Nutlets* ovoid, compressed, inner face angled.

MANIPUR (*Watt*).

Used like *P. parviflorus* *Benth*.

3. *Pogostemon villosus* Benth.

A stout erect villous herb. *Leaves* ovate-acuminate, crenulate. *Flowers* densely crowded in paniced spikes. *Calyx* villous.

KAMRUP.

Flrs. 2. Fr. Hot season.

4. *Pogostemon parviflorus* Benth.

Shrubby; stem quadrangular, usually purplish. *Leaves* 1·5-6 by 1·3·5 in., ovate or ovate-lanceolate, acute or acuminate, irregularly or doubly crenate or toothed, membranous, scaberulous above, usually glabrous beneath; petiole 2·2·5 in. long. *Flowers* in dense paniced spikes. *Calyx* ·16 in. long, glandular pubescent; teeth short. *Corolla* white. *Filaments* beaked with purplish hairs. *Nutlets* ellipsoid, inner face angled.

LOWER ASSAM.

The fresh leaves when bruised are applied as a cataplasm inside to clean wound and provide healthy granulation. The roots are reputed to be a remedy for snake bite (*I.M.P.*).

Flrs. 10-12. Fr. Cold season.

5. *Pogostemon paniculatus* Benth.

A branched herb. *Leaves* 3-6 by 2-4 in., pairs unequal, ovate, irregularly inciso-serrate, rather thinly membranous, hairy; base cuneate; petiole ·8-1·8 in. long. *Bracts* obliquely suborbicular, pubescent, veined, imbricate. *Nutlets* smooth, ovoid.

KHASI HILLS (Mann 64).

6. *Pogostemon elsholtzioides* Benth.

Shrubby 6-8 ft. high; young parts hoary tomentose; mature branches light purplish. *Leaves* aromatic, 1·5-4 by ·5-1 in., lanceolate-acuminate, serrulate, sub-coriaceous, glabrescent above, glabrous beneath; base acute; petiole

·1-·2 in. long; spikes up to 4 in. long. *Calyx* hoary not ciliate; teeth unequal. *Corolla* purplish.

GOALPARA, MANIPUR, NAGA HILLS, KHASI HILLS (5,000 ft.).

Flrs. & Fr. Cold season.

P. glaber Benth., *P. fraternus* Miquel., *P. strigosus* Benth., *P. brachystachys* Benth., are herbs recorded from the region of the flora.

P. hispidus Prain.

An undershrub, erect, ·3-·4 in. high; stem tetragonous, purplish, partially pubescent. *Leaves* 2-3-3-2 by 1-2-2 in., decussate, ovate-acute or acuminate, dentate-serrate except towards the base, herbaceous; nerves above sparsely appressed, pubescent; nerves beneath sparsely hispid; base cuneate; petiole ·6-1 in. long, sparsely appressed hispid. *Verticellaster* in simple spikes or sparingly branched; peduncles ·6-1-6 in. long, appressed pubescent; bracts-ovate or ovate-lanceolate, often foliaceous, largest 3-2 in. long, 1-2-2 in. broad. *Calyx* narrowly campanulate, ·17 in. long, sparingly hispid without; segments triangular, acute, equal; tube short. *Corolla* pale lilac, ·17 in. long, glabrous; lobes sub-equal. *Filaments* lilac, sub-ascendingly branched; style branches sub-equal, ·05 in. long. *Nutlets* (nucule) ovoid glabrous.

K. & J. HILLS (Hooker & Thompson).

10. DYSOPHYLLA Blume.

Herbs. *Leaves* opposite or whorled. *Flowers* minute, in dense whorls collected into close terminal spikes. *Calyx* equally 5-toothed; throat naked. *Corolla* equally 4-lobed; tube exserted. *Stamens* 4, exserted, straight or subdeclinate; filaments very long, bearded; anther-cells confluent. *Disk* regular, subentire. *Nutlets* smooth or rough, ovoid or oblong.

Leaves opposite (in pairs):—

Stem with spreading hairs:—

Corolla usually pinkish. 1. *D. auricularia*.

Leaves in whorls:—

Stem and leaves hairy:—

Leaves narrowly oblong or lanceolate, serrate or sub-entire. *Calyx* sometimes glabrate. 2. *D. quadrifolia*.

Leaves linear, entire:—

Calyx villous. 3. *D. cruciata*.

Stem hairy at the nodes and leaves sparsely hairy or glabrate:—

Leaves linear; margins revolute; spikes short upto 2 in. Calyx glabrous. .. 4. *D. linearis*.

Stem and leaves glabrous or nearly so:—

Fruiting calyx stellate, spreading. .. 5. *D. verticillata*.

Fruiting calyx not stellately spreading (erect or conniving). 6. *D. crassicaulis*.

1. *Dysophylla auricularia* Blume.

A hairy coarse annual. *Leaves* 1-3 by .5-1 in., ovate-lanceolate or ovate-oblong, acute, serrate, hairy; petiole 0.1 in. long. *Calyx* enlarged in fruit; mouth closed by the inflexed teeth. *Nutlets* ellipsoid, pale brown, smooth.

KHASI HILLS (4,000 ft.).

Flrs. 6. Fr. Cold season.

2. *Dysophylla quadrifolia* Benth.

A perennial with thick root-stock extremities; young parts tomentose. *Leaves* 1-3 by .1-2 in., linear-oblong, serrate or subentire, tomentosely hairy; petiole 0.1 in. long. *Spike* pinkish, very dense, upto 8 in. long. *Nutlets* very small, ovoid, brown.

KHASI HILLS (4,000 ft.).

Flrs. & Fr. 6-8.

3. *Dysophylla cruciata* Benth.

A stout strict erect herb, densely villous. *Leaves* .7-2 in., sessile, linear, entire, obtuse or subacute, densely villous. *Flowers* pale purple. *Fruiting* calyx teeth erect. *Stamens* purple bearded. *Nutlets* black, smooth, shining, ellipsoid.

KHASI HILLS (4,000 ft.).

Flrs. & Fr. 10-3.

4. *Dysophylla linearis* Benth.

An erect annual; stem hairy at the nodes. *Leaves* 1-3.5 in., linear, in whorls of 4, obtuse, margins revolute,

usually entire, sparingly and finely hairy. *Stamens* much exerted, rose coloured, villous.

KHASI HILLS (5,000 ft.).

Flrs. 9. Fr. Cold season.

5. *Dysophylla verticillata* Benth.

An erect branched annual; hollow stemmed. *Leaves* 1·3 by ·1·2 in., in whorls of 4-10, spreading and deflexed, linear or linear-lanceolate, entire or obscurely serrate, almost glabrous. *Spikes* very dense, upto 2·75 in. long. *Fruiting* calyx conspicuous with stellately spreading teeth. *Nutlets* pale brown.

GARO HILLS.

Flrs. & Fr. Cold season.

6. *Dysophylla crassicaulis* Benth.

Leaves 1·2 by ·1·2 in., linear-lanceolate. *Spikes* large, upto 4·5 in. long. *Fruiting* calyx teeth erect or conniving. *Nutlets* orbicular, blackish.

KHASI HILLS, SYLHET, ASSAM.

Flrs. & Fr. Cold season.

Var. *pumila* Benth. The herb is dwarfish. *Leaves* ·3·8 by ·05·1 in., linear-lanceolate. *Spike* dwarfed.

Plains of ASSAM.

Flrs. & Fr. Cold season.

11. ELSHOLTZIA Willd.

Herbs or undershrubs, often aromatic. *Flowers* very small in large whorls, crowded into simple or paniced spikes. *Calyx* erect, 5-toothed, often enlarged in fruit. *Corolla* tube straight or incurved; limb oblique or sub-2-lipped; upper lip notched, erect; lower spreading. *Stamen* 4, divergent or distant; filaments naked; anther-cells divaricate or alternately confluent. *Disc* much produced behind the ovary; style sub-equally 2-fid, with subulate lobes. *Nutlets* smooth, or tubercled.

Spikes paniced:—

Bracts subulate or acicular:—

Corolla yellow:—

Fruiting calyx inflated. Nutlets
ellipsoid. 1. *E. flava*.

Corolla white:—

Corolla tube twice as long as the calyx :—

Fruiting calyx narrowly tubular,
curved, ribbed to the base. Nutlets
oblong. Leaves sub-sessile. 2. *E. polystachya*.

Corolla tube short:—

Fruiting calyx urceolate, glandular-
pubescent. Nutlets broadly ellipsoid.
Leaves petioled. 3. *E. blanda*.

1. *Elsholtzia flava* Benth. Vern. *Ja-Tang-ning*, Khasi.

A gregarious undershrub upto 8 in. high. *Bark* pale-brown; branchlets quadrangular; whole plant is covered with golden dots. *Leaves* 2-7·5 by 1·5-4·5 in., ovate, long acuminate, crenate or coarsely serrate, membranous, scaberulous above specially along the nerves, closely gland-dotted beneath; lateral nerves 6-8 on either half, oblique, arcuate; petiole ·5-3 in. long, scaberulous. *Inflorescence* dense, axillary and terminal; bracts deciduous, ovate or lanceolate. *Flowers* yellow, ·25 in. long. *Calyx* tubular, inflated, equally 5-toothed. *Corolla* tube twice as long as the calyx. *Nutlets* ellipsoid, dark-brown.

KHASI HILLS (6,000 ft.).

Flrs. 9. Fr. 11.

2. *Elsholtzia polystachya* Benth. Vern. *Ja-tonwing-rit*, Khasi.

A pubescent shrub up to 8 in. high. *Bark* fibrous, peeling off in longitudinal strips; branchlets obscurely quadrangular. *Leaves* 1-2·5 by ·5-2 in., elliptic-lanceolate, acuminate, serrate or crenulate, thinly coriaceous, pubescent, gland-dotted beneath; lateral nerves prominent beneath; base narrowed into the petiole 0·1 in. long. *Spikes* 4-10 in. long. *Flowers* minute. *Fruiting* calyx tubular, curved, ribbed at

the base; teeth 5, erect. *Corolla* white, pubescent. *Nutlets* oblong.

KHASI HILLS.

Flrs. 9-10. Fr. Cold season.

3. *Elsholtzia blanda* Benth.

A shrubby perennial; branches obscurely quadrangular. *Leaves* very sweet scented, 1.5 by .3-1 in., lanceolate, narrow-elliptic, acuminate, serrate, membranous, puberulous above, closely gland-dotted beneath; base narrowed into the petiole .05-.4 in. long. *Spikes* 2.4-5 in. long. *Fruiting* calyx urceolate, glandular, pubescent, short; mouth contracted. *Corolla* tube short, sparingly pubescent. *Nutlets* ellipsoid.

N. E. F. TRACT, KHASI HILLS.

Flrs. 11. Fr. Cold season.

E. Griffithii Hook. f., *E. pilosa* Benth., *E. cristata* Willd. are herbaceous plants recorded from the region of the flora.

E. Thomsoni Hk. f. Vern. *Duera*, Garo.

Flowers pale-mauve.

GARO HILLS (Richu).

E. communis Coll. et Hemsl. (*Dysophylla communis* Coll. et Hemsl.).

Herb, puberulous; branches tetragonous. *Leaves* about 3.5 in. long, opposite, oblong, membranous, obtuse, crenate; base alternate. *Flowers* rosy in dense terminal cylindrical spike. *Calyx* cylindric, puberulous, 5-toothed (equal). *Corolla* pilose outside. *Stamens* shortly exserted; filaments glabrous. *Fruit* not seen.

Shan Hills (4,000 ft.).

12. PERILLA Linn.

Perilla ocimoides Linn. Vern. *Arim*, Garo; *Kenia*, *Angami*, Naga.

A strongly aromatic bush, about 2-4 ft. high; stem leaves and petiole covered with grey hairs. *Leaves* 2.4-5 by 1.3 in., ovate or sub-orbicular, coarsely serrate, acuminate, membranous, scaberulous above, hairy beneath specially along the nerves; petiole 1-3 in. long. *Flowers* small, white, in axillary or terminal spicate racemes. *Fruiting* calyx villous.

Corolla campanulate, 5-fid; lobes unequal. *Stamens* 4, subequal, erect, distant; anther-cells distinct, parallel, afterwards diverging; style equally 2-fid. *Nutlets* coarsely reticulate, subglobose.

KHASI HILLS (5,000 ft.), NAGA HILLS, SIBSAGAR.
The Nagas eat leaves and seeds.

Flrs. & Fr. Cold season.

13. MENTHA Linn.

***Mentha arvensis* Linn.** *Pudnia* Kh.; *Padina*, Beng. Cultivated throughout the province, also runs wild in KHASI HILLS.

The dried plant is refrigerant, stomachic, diuretic and stimulant (I.M.P.). A *chutney* is made from the leaves with tamarind.

***M. piperita* Linn.** The peppermint. Cultivated, officinal in Pharmacopœia.

14. MOSLA Ham.

***Mosla dianthera* Maximovicz.**

A strongly scented erect herb. *Leaves* .5-.15 by .2-.3 in., ovate, acute, serrate, membranous, glandular-punctate below; petiole .2-.5 in. long. *Flowers* minute in slender terminal racemes. *Calyx* campanulate, 5-toothed, enlarging in fruit. *Corolla* white or purplish. *Stamens* 2, staminodes 2; anther-cells 2, divaricate. *Nutlets* globose, reticulate.

KHASI HILLS (4,000 ft.).

Flrs. Hot season. Fr. 6.

15. CALAMINTHA Mœnch.

***Calamintha repens* Benth.**

A sparsely hairy decurrent herb. *Leaves* .5-1.5 by .4-.8 in., ovate, toothed, acute. *Flowers* small, in dense whorls, panicled or spicate. *Calyx* 13-nerved .25 in. long. *Corolla* bilabiate; throat villous. *Stamens* 4, didynamous. *Nutlets* subglobose, smooth.

KHASI HILLS.

Flrs. & Fr. 7-11.

16. MELISSA Linn.

Melissa parviflora Benth.

A gregarious herb. *Leaves* .5-3 by .4-1 in., ovate or ovate-lanceolate, acute, serrate, membranous, glabrous; base acute or rounded; petiole .1-.6 in. *Flowers* white, numerous, in axillary whorls. *Calyx* ribbed; teeth variable. *Corolla* tube recurved, exceeding the calyx; upper lip erect; lower lip spreading, 3-lobed. *Stamens* 4; anther-cells ultimately divaricate. *Nutlets* narrowly obovoid, darkish, smooth.

KHASI HILLS (5,000 ft.).

Used for stomach ache; also in liver and heart diseases and weakness of sight, etc. (I.M.P.).

Flrs. 7-9. Fr. Cold season.

17. MERIANDRA Benth.

Meriandra bengalensis Benth. The Bengal sage.

A shrub strongly smelling of camphor. *Leaves* 2-3 in. long, obtuse; base rounded; petiole .2-.5 in. long. *Flowers* white in globose whorls in terminal spikes.

Cultivated in Indian garden, imported from Abyssinia. Possesses the properties of sage (*Salvia officianalis*).

18. SALVIA Linn.

Salvia saxicola Wall.

A dwarf, almost scapigerous, perennial with woody root-stock. *Leaves* 1-3 in. across, broadly ovate or sub-orbicular, coarsely crenate, almost scaberulous above, hairy beneath along the nerves, cordate; petiole .5-3 in. long. *Scape* 5-10 in. long. *Calyx* enlarged in fruit, glandular hairy. *Corolla* short, purplish. *Stamens* 2, perfect, connective with the antheriferous arm, decurved; the other shorter, acute (F.B.I.). *Nutlets* ellipsoid, smooth, .1 in. long.

KHASI HILLS (5,000 ft.).

Flrs. 6. Fr. Rainy season.

Salvia coccinea Linn.

A slender herb attaining about 2 ft. with beautiful scarlet flowers; often cultivated in gardens.

19. SCUTELLARIA Linn.

Herbs or undershrubs. *Inflorescence* various. *Calyx* 2-lipped, closed in fruit; upper lip furnished with a large broad shield-like or pouch-like scale, finally deciduous. *Corolla* bilabiate; tube usually sharply recurved from the base, erect (not annulate within); upper lip entire or notched, lower 3-lobed. *Stamens* 4; anthers conniving, ciliate; lower 1-celled; upper 2-celled. *Disc* elongate. *Ovary* oblique. *Nutlets* 4, minute, granulate or hispidulous.

Flowers racemose:—

Bracts (almost all) shorter than the pedicel and calyx:—

Stem minutely pubescent. Leaves purple beneath. Nutlets tuberculate. 1. *S. discolor*.

Bracts longer than the pedicels and calyx:—

Stem dwarf, glandular hairy:—

Corolla .3 in. Leaves sessile. 2. *S. glandulosa*.

Stem 2-3 ft., glabrescent:—

Corolla .5 in. Leaves long, petiolate. 3. *S. khasiana*.

Flowers spicate, axillary:—

Stem dwarf, glabrous:—

Corolla .2-.5 in. Leaves shortly petioled.

Nutlets granulate. 4. *S. rivularis*.

1. *Scutellaria discolor* Coleb.

A pubescent annual. *Leaves* 1-3 by .5-1.5 in., chiefly radical, rosulate, orbicular or oblong or elliptic, obtuse, crenate, pubescent; base rounded or cordate; petiole upto 2 in. long. *Flowers* trumpet shaped, generally all forming the same cluster .6-1 in. long, bluish purple on erect racemes; lip of corolla whitish above; upper lip hooded. *Nutlets* 4, disclosed after the fall of upper calyx lip, granulate, turbinate.

KHASI HILLS.

Flrs. & Fr. 9-2.

2. *Scutellaria glandulosa* Hk. f.

A dwarf herb, glandular-hairy. *Leaves* 1.5-2.5 by .8-1.4 in., oblong-lanceolate, obtuse, irregularly serrate, sparsely hairy. *Flowers* opposite in glandular racemes.

KHASI HILLS.

The paste of the leaves is used for cuts.

Flrs. 4-7.

3. Scutellaria khasiana Clarke.

A glabrescent herb 2-3 ft. high. *Leaves* 1·5-2 in., ovate-acute, crenate, membranous, glabrous; base acute. *Racemes* pubescent. *Corolla* pale blue. *Nutlets* granulate.

KHASI HILLS, NAGA HILLS.

4. Scutellaria rivularis Wall.

A dwarf, glabrous herb with stem creeping below. *Leaves* ·5-1·5 by ·2-·4 in., ovate or lanceolate, entire or crenate; base rounded or cordate; petiole 0-·2 in. long. *Racemes* all axillary, spicate. *Nutlets* granulate.

KHASI HILLS (4,000 ft.).

Flrs. 5-10. Fr. Cold season.

20. BRUNELLA Linn.**Brunella vulgaris Linn.**

A perennial with creeping woody root-stock. *Leaves* ·5-2 by ·3-·8 in., ovate or ovate-lanceolate, subobtuse, usually entire or obscurely toothed, hispidly hairy on both sides; petiole upto 1·5 in. long. *Flowers* deep blue in dense whorls collected in compact heads; bracts ovate-cordate, ciliate, apiculate. *Stamens* 4, didynamous, exserted. *Disc* erect. *Ovary* on a gonophore. *Nutlets* smooth, oblong.

KHASI HILLS.

The green leaves smeared with castor-oil is also applied externally in case of painful piles.

Regarded as expectorant and antispasmodic.

Flrs. 6-7. Fr. Cold season.

21. CRANIOTOME Reichb.**Craniotome versicolor Reichb.**

A softly hirsute perennial. *Leaves* 1 by ·8-2 in., broadly ovate-acuminate, toothed or crenate, hirsute on both sides, cordate; petiole upto 1·8 in. long. *Flowers* minute, crowded in cymes forming terminal panicle. *Calyx* ovoid, enlarged in fruit, equally 5-toothed. *Corolla* far exceeding the calyx.

bilabiate; upper lip hooded. *Stamens* 4, in unequal pairs; anther-cells didynamous, alternately diverging. *Nutlets* minute, sub-globose, pale, shining.

KHASI HILLS.

Flrs. & Fr. 8-11.

22. ANISOMELES Br.

Anisomeles ovata Br. Vern. *U-nei-maias*, Khasi; *Bontil*, Ass.

A shrub-like, strongly scented, pubescent or tomentose herb. *Leaves* 1-3 by .8-1.5 in., ovate, coarsely crenate, acuminate, softly pubescent or tomentose; *petiole* upto 1.5 in. long, densely hairy. *Flowers* purplish blue, in dense-flowered whorls on terminal shoots; lower whorls arising from leaf axils. *Calyx* .3 in. long, tubular, hirsute; teeth acuminate, enlarging in fruit. *Corolla* .6-.7 in. long, 2-lipped; tube short; upper lip pale purple, short, entire, erect; lower sparsely 3-lobed; mid-lobe 2-fid. *Stamens* exserted, didynamous; filaments hairy or bearded. *Nutlets* smooth, black, ovoid, .1 in. long.

Plains of ASSAM.

An oil is distilled from it which found useful in uterine affections. It has also corrective astringent and tonic properties. (I.M.P.).

Flrs. 10. Fr. 1-2.

23. COLQUHOUNIA Wall.

Tall robust plants, shrubby, usually rambling; branches terete. *Flowers* orange or pinkish, in axillary whorls or lax-fid, spikes or racemes. *Calyx* sub-equally 5-toothed; throat naked, 10-nerved. *Corolla* bilabiate; tube incurved, narrowed; throat inflated; upper lip entire or notched; lower 3-lobed. *Stamens* 4; anther-cells divergent; style subequally 2-fid. *Nutlets* lip produced into a wing.

Flowers usually in axillary clusters or terminal racemes, stellately hairy:—

Calyx teeth triangular:—

Corolla often glandular hairy at the lip,
reddish or orange, wing of nutlets not
entire.

1. *C. coccinea*.

Flowers in axillary capitate whorls, pubescent with simple hairs:—

Calyx teeth acuminate:—

Corolla not glandular hairy at the lip, wing of nutlets entire. 2. *C. elegans*.

Flowers in terminal or axillary spikes or in axillary clusters, densely woolly:—

Calyx woolly:—

Corolla rosy pink, 1·25 in. long. 3. *C. vestita*.

1. *Colquhounia coccinea* Wall. Vern. *Dieng-jalong-skei*, *Jalong-sykei*, Khasi.

A rambling shrub 8-10 ft. high, tomentose or stellately hairy on stem and leaves. *Leaves* 1·5-5 by ·5-2·5 in., ovate or ovate-lanceolate, acuminate or acute, coarsely crenate, subcoriaceous, stellately hairy above, stellately whitish tomentose beneath; lateral nerves 8-11 on either half, oblique, impressed above, prominent beneath; base usually rounded; petiole ·3-1·2 in. long. *Flowers* orange or reddish, usually in axillary clusters or terminal racemes. *Calyx* about ·5 in. long, stellately tomentose; teeth triangular. *Corolla* 1·4 in. long, hairs many celled, glandular at the lip. *Nutlets* compressed, wings sub-laciniate not longer than the body of the nut.

KHASI HILLS.

Flrs. & Fr. 8-2.

2. *Colquhounia elegans* Wall.

A shrub, 8-10 ft. high, tomentose or with simple hairs on stems. *Leaves* 2-4 by 1-1·9 in., ovate-elliptic, acuminate, serrate, coriaceous, tomentose; lateral nerves 4-5 on either half; base cuneate; petiole ·2-·8 in. long. *Flowers* in axillary capitate whorls. *Calyx* ·3 in. long; teeth acuminate. *Corolla* tube bearded, far exceeding the calyx; hairs few celled, glandular at base. *Nutlets* flattened, wings of nutlets entire, acute, longer than the body of the nut.

MANIPUR, KHASI HILLS.

Flrs. 2-3. Fr. 11.

3. *Colquhounia vestita* Wall.

A shrub, densely woolly. *Leaves* 1·5-5·5 by ·75-2·5 in., ovate, elliptic-lanceolate, elliptic-ovate, irregularly crenate, acuminate, rather sub-coriaceous, stellately tomentose on both surfaces, rugose above; lateral nerves 9-12 on either half, prominent beneath, oblique, subparallel; petiole ·3-1·2 in. long. *Flowers* rose pinkish, in axillary clusters or axillary and terminal spikes. *Calyx* funnel-shaped, woolly; teeth triangular. *Corolla* 1-1·25 in. long, hairy outside.

KHASI HILLS, (6,000 ft.). MISHMI HILLS (Griffith).

Flrs. 7.

I do not notice very much specific difference with *C. coccinea* Wall. There is slight difference in the inflorescence and the length of the corolla. There is also evidence that the pubescence to some extent becomes stellate in the Khasi Hills species. I agree with Brandis and consider it a form of *C. coccinea* Wall.

Colquhounia Seguini Van. (Bull. Acad. Geogr. Bot. XIV (1904) (165).

A straggling shrub, glabrous; young parts somewhat puberulous; branches opposite. *Leaves* long-petiolate, acuminate, alternate, ovate-oblong, glabrous; base attenuate or cuneate. *Flowers* dull red, medium-sized in few flowered verticillaster (whorls). *Calyx* glabrous, sub-incurved, 10-striate, 5-toothed; teeth unequal, triangular, broad. *Corolla* red. *Nutlet* blackish, dry; samara-shaped.

CHINA, LUSHAI HILLS (4,000 ft.). (Wenger 436).

24. LEONURUS Linn.

Leonurus sibiricus Linn.

An annual, 3-6 ft. high; stem quadrangular, tomentose. *Leaves* 2-4·5 by ·5-1·4 in., pinnatipartite or palmatipartite, lobes again incised, tomentose; petiole slender 0·5 in. long. *Flowers* reddish in axillary densely flowered numerous whorls; bracts subulate. *Calyx* 5-nerved, ·25 in. long; teeth 5, spinescent. *Corolla* tube straight, not annulate. *Stamens* 4; anthers conniving, cells transverse. *Nutlets* ·1 in. long, 3-quetrous, truncate, glabrous.

SYLHET.

The root, leaves and juice are used as a febrifuge (I.M.P.).

Flrs. & Fr. 1-4.

25. LEUCAS Br.

Herbs, undershubs or shrubs, usually pubescent or villous. *Flowers* usually white, in axillary, usually distant whorls, rarely crowded or quite terminal. *Calyx* tubular, 10-nerved, equally or unequally 6-10-toothed, mouth regular or oblique. *Corolla* tube bilabiate, included, annulate or naked within, upper lip erect, concave or hooded, villous at the top; lower spreading, 3-fid, with very large mid-lobe. *Stamens* 4, ascending; anthers conniving, cells divaricate, at length confluent. *Style* subulate, the posterior lobe obsolete. *Nutlets* obtuse, ovoid, 3-quetrous; basal scar small.

Annuals:—

Flowers in terminal or axillary whorls:—

Calyx tube erect, not bent in the middle;
mouth oblique; teeth short; bracts few,
short, fairly pubescent. 1. *L. linifolia*.

Flowers in sub-terminal many flowered whorls:—

Calyx tube uniform, obliquely imbricate;
teeth short; bracts few, linear-ciliate. 2. *L. zeylanica*.

Flowers in very large terminal globose whorls:—

Calyx tube slightly oblique at the mouth;
teeth subequal; bracts membranous, linear-
elliptic or lanceolate, curved. 3. *L. cephalotes*.

Flowers in terminal or axillary large globose whorls:—

Calyx (mouth) straight; teeth spreading,
ciliate; throat villous; bracts as long as
the calyx, hirsute, densely silky tomentose.
Leaves membranous, coarsely serrate. 4. *L. ciliata*.

Perennial:—

Flowers in dense whorls:—

Mouth of calyx straight:—
Calyx teeth rarely spreading; mouth
naked; bracts setaceous. 5. *L. lanata*.

1. *Leucas linifolia* Spreng.

An erect annual; stem pubescent, grooved. *Leaves* 1-4 by .1-.4 in., linear-lanceolate, entire or distantly shallow crenate-serrate, acute, membranous, finely pubescent; petiole 0-2 in. long. *Flowers* large, white. *Nutlets* brown, obtuse.

KHASI HILLS.

It is believed that the leaves when roasted and eaten with salt, have febrifugal properties.

Fr. 1-3.

2. *Leucas zeylanica* Br.

An erect, pubescent or hispid annual; hairs spreading, deflexed or adpressed. *Leaves* sub-sessile 2·3·5 by ·5··75 in., linear or linear-lanceolate, obtuse, pubescent. *Flowers* white. *Calyx* not prominently nerved, hispid.

CACHAR, ASSAM.

The leaves are bruised and a tea spoonful of the juice is snuffed by the Cenghalese as a remedy for snake bite. The fresh juice is also efficacious in head-ache and cold.

Flrs. 8-11. Fr. Cold season.

3. *Leucas cephalotes* Spreng.

A stout coarse herb; hairs spreading. *Leaves* 1·5-3 by 1·1·5 in., elliptic-lanceolate or ovate-lanceolate, obtuse, distantly crenate, membranous, more or less pubescent; petiole ·1··5 in. long; bracts prominently nerved.

Plains of ASSAM.

The plant is officinal, being considered stimulant and diaphoretic (*I.M.P.*). The seeds yield a medicinal oil (Campbell). The leaves are eaten as a pot-herb. (Haines).

Fr. 9-1.

4. *Leucas ciliata* Benth.

A straggling aromatic hirsute annual; branches quadrangular, hairs spreading and deflexed. *Leaves* ·8-2 by ·2··5 in., (Assam record), narrow lanceolate or elliptic-lanceolate, acute, coarsely and shallowly serrate, membranous, pubescent with bulbous hairs; narrowed at base; petiole up to ·6 in. long. *Calyx* teeth ciliate. *Upper* lip of corolla densely clothed with yellowish golden hairs. *Nutlets* oblong, smooth.

KHASI HILLS.

Flrs. 7. Fr. Cold season.

5. *Leucas lanata* Benth. Vern. *Drona*, Sans.; *Dandakalas*, Sylh.; *Guma*, Hind.; *Chandrong-a-an*, Mik.; *Doron*, Ass.

A silky tomentose perennial with woody root-stock, hairs erect or spreading, not deflexed. *Leaves* 1·2·5 by ·2··4 in.,

ovate or suborbicular, crenate-serrate, acute; base obtuse; petiole 0·5 in. long. *Corolla* large white, bilabiate; lower lip longer than the bearded upper.

Young shoots are used as vegetable in the U. P. Tender leaves fried are said to be good for cough. The juice of leaves bruised with lime is used for inflammation.

GOALPARA, NOWGONG, N. C. HILLS. Fairly common in SURMA VALLEY—(R. N. De).

Flrs. & Fr. Cold season and hot season.

Phlomis rugosa Benth—is recorded from Pongtung—K. & J. HILLS.

26. GOMPHOSTEMMA Wall.

Coarse, stellately pubescent or tomentose herbs or undershrubs; roots sometimes bearing tubers. *Flowers* usually yellow, in short cymes forming whorls which are axillary or in dense terminal spikes; bracts lanceolate or linear. *Calyx* campanulate, 10-nerved, subequally 5-toothed. *Corolla* bilabiate; tube slender, throat dilated; upper lip galeate, lower lip broadly 3-lobed. *Stamens* 4, ascending; anthers connivent in pairs; cells transverse, parallel. *Disk* uniform or produced behind. *Style*-lobes subulate, subequal. *Nutlets* drupaceous, glabrous or pubescent (3-1 by reduction) corky or fleshy.

Upper or all whorls in terminal or axillary spikes:—

Calyx ·3 in., teeth triangular:—

Leaves long petioled 3-12 in. long. .. 1. *G. pedunculatum*.

Calyx ·6 in., teeth lanceolate:—

Leaves sub-sessile, 2·3·5 in., long. .. 2. *G. nutans*.

Whorls axillary:—

Stem stout:—

Bracts small, subulate:—

Calyx ribbed, ·5 in. long. Corolla 1·5 in., pubescent. .. 3. *G. lucidum*.

Bracts slender, membranous:—

Calyx ·3 in. long. Corolla ·5 in. .. 4. *G. niveum*.

Bracts slender or broad and leafy:—

Calyx ·3 in. long. Corolla 1 in., glabrate. .. 5. *G. parviflorum*.

Bracts linear or lanceolate, as long as the calyx:—

Calyx ·5 in., long. Corolla glabrous, tube very slender, 1 in. long. .. 6. *G. Thomsoni*.

Stem slender, prostrate :—

Leaves puberulous, sparsely hairy, obscurely toothed; base acute:—

Corolla 1·5 in., pubescent; throat inflated. 7. *G. melissæfolium*.

Leaves densely velvety tomentose, crenate; base cuneate:—

Corolla 1 in. long, throat inflated to some extent. 8. *G. velutinum*.

Stem slender, short, pubescent:—

Leaves crenate or rounded or cordate:—

Corolla 2 in. long, pubescent, yellow; tube gradually dilated into the throat. .. 9. *G. Mastersii*.

1. *Gomphostemma pedunculatum* Benth.

A tall prostrate perennial. *Leaves* 5-12 by 3-4 in., ovate or elliptic-ovate, acuminate, denticulate, sub-coriaceous, pubescent; lateral nerves 6-8 on either half; base cuneate; petiole 1-1·5 in. long. *Calyx* teeth 5, acute, triangular, hirsute. *Corolla* pale-yellowish, ·6 in. long. *Filaments* hairy. *Nutlets* rugose, subglobose, ·2 in. long.

KHASI HILLS (3,000 ft.). (No specimen in Forest herbarium, Shillong).

2. *Gomphostemma nutans* Hook. f.

A slender perennial. *Leaves* 2-3·5 in., ovate-acute, loculate, pubescent above, glabrous beneath; base acute; petiole ·15-·25 in. long. *Calyx* ·6 in., teeth lanceolate. *Corolla* 1-1·5 in. long. *Nutlets* rugose.

KHASI HILLS.

3. *Gomphostemma lucidum* Wall.

A stout undershrub 6-8 ft. high (stem ferruginous tomentose in Mann's collection). *Leaves* 2·5-7·5 by 1-2·5 in., elliptic, elliptic-lanceolate, acute or acuminate, irregularly and distantly serrate, subcoriaceous, puberulous above, pubescent beneath (almost stellate); lateral nerves 5-7 on either half, oblique; petiole ·3-1 in. *Calyx* pubescent, cupular

in fruit, $\cdot 3$ in. across. *Corolla* pubescent. *Nutlets* oblong, $\cdot 2\text{--}\cdot 3$ in.

KHASI & JAINTIA HILLS.

Flrs. 7. Fr. 9.

4. *Gomphostemma niveum* Hook. f.

An erect, stout perennial; stem tomentose. *Leaves* 8-12 by 3-3 \cdot 5 in., oblanceolate or elliptic-obovate, acute (acuminate *F.B.I.*), obscurely serrate, coriaceous, glabrous above, white-tomentose beneath; lateral nerves about 8 on either half, impressed above, prominent beneath; base narrowed into the petiole $\cdot 05\text{--}\cdot 2$ in. long. *Bracts* membranous. *Calyx* teeth subulate, as long as the tube. *Corolla* $\cdot 5$ in. *Nutlets* $\cdot 16$ in., oblong.

ASSAM (Mann's No. 96).

Fr. 4.

5. *Gomphostemma parviflorum* Wall.

A stout undershrub 5-6 ft. high, often gregarious. *Leaves* 4-14 by 1 \cdot 5-4 \cdot 5 in., broad, oblanceolate, elliptic or elliptic-lanceolate, acute or acuminate, dentate, coriaceous, stellately pubescent above, tomentose beneath; lateral nerves 6-9 on either half; base narrowed into the stout petiole $\cdot 5\text{--}2$ in. long. *Cymes* pubescent, fascicled, peduncled, crowded towards the ends of branchlets. *Calyx* pubescent; teeth subulate. *Corolla* 1 in., almost glabrous; tube slender. *Nutlets* ellipsoid or globose.

K. & J. HILLS, SYLHET, KAMRUP, GOALPARA.

Flrs. 8-9. Fr. 10-12.

Var. typica and *Var farinosa* Prain, are both recorded from the region of the flora.

6. *Gomphostemma Thomsoni* Benth.

A hoary woody shrub about 8 ft. high, very variable. *Leaves* 5-10 by 2-4 in., oblong or broadly oblong, ovate, acute, crenulate, subcoriaceous, pubescent above, tomentose beneath; lateral nerves about 10 on either half; base cuneate;

petiole 1·5-4 in. long. *Calyx* ·5 in., tube narrow, teeth subulate. *Corolla* yellow; glabrous. *Nutlets* rugose, oblong, ·25 in long.

K. & J. HILLS.

Flrs. 6-7 Fr. 8-9.

G. melissæfolium Wall., *G. velutinum* Benth. and *G. Mastersii* Benth., are slender perennials which are also recorded from the region of the flora.

27. LEUCOSCEPTRUM Smith.

***Leucosceptrum canum* Sm.** Vern. *Tiu-toti-tip*, Khasi; *Dieng-lakchhi*, Synt.

A small tree (30 ft.); branches, inflorescence, under-surface of leaves and petiole densely clothed with hairs or pale brown tomentum; bark grey, thin, smooth; inside green. *Leaves* 2·5-9 by 1·4 in., elliptic, elliptic-lanceolate, acuminate, crenate-serrate or entire, coriaceous, glabrous above when mature; lateral nerves 10-13 on either half, sub-parallel; base cuneate; petiole ·5-1·5 in. long. *Flowers* white or pinkish, in dense cylindrical spikes, 4-6 in. long; bracts transversely oblong, sub-reniform, glabrous above, tomentose beneath; pedicels short. *Calyx* hairy without. *Corolla* slightly exceeding the calyx. *Stamens* 1 in. long, pinkish; anthers reniform. *Nutlets* triquetrous.

KHASI HILLS.

Flrs. 6-11. Fr. Cold season.

28. TEUCRIUM Linn.

***Teucrium quadrifarium* Buch-Ham.**

A tomentose or villous shrubby perennial. *Leaves* ·5-3 by ·3-1·2 in., ovate, oblong-ovate, cordate, crenate, sub-coriaceous, hairy; petiole ·05-·3 in. long. *Flowers* shortly pedicelled, in terminal spiciform racemes; bracts large, ovate-acuminate, shortly stalked, pinkish near the base. *Calyx* 2-lipped, 10-ribbed; teeth 5, the uppermost ·16-·2 in. deep. *Corolla* tube not annulate, hardly exceeding the calyx. *Stamens* 4,

didynamous, exserted; anthers reniform, confluent. *Disc* symmetrical. *Nutlets* minute.

KHASI HILLS (5000 ft.).

Flrs. 8.

T. viscidum *Bl.* Syn. *T. stoloniferum* Roxb.

An erect pubescent herb. *Leaves* 1·3 by ·6-2 in., ovate, crenate; petiole upto 1 in. long. *Corolla* tinged purple is also recorded from KHASI HILLS, 500 ft.

Flrs. 6.

FAM. 102. PLANTAGINACEÆ.

Scapigerous herbs annual or perennial, glabrous or hairy. *Leaves* usually radical. *Scapes* axillary. *Flowers* small, greenish, spicate, often dimorphic. *Calyx*-segments 4, imbricate in bud, persistent. *Corolla* hypogynous, salver-shaped, scarious; lobes 4, imbricate in bud. *Stamens* 4, inserted on the corolla tube; filaments capillary, inflexed in bud, persistent; anthers large, pendulous, versatile. *Ovary* superior, 1-4-celled; style filiform with 2 lines of stigmatic hairs; ovules 1-8 in each cell. *Capsule* membranous, 1-4-celled, dehiscent circumscissile. *Seeds* usually peltate (attached by the centre); testa thin, mucilaginous; albumen fleshy; embryo cylindric, transverse; radicle inferior.

PLANTAGO Linn.

***Plantago erosa* Wall.** Syn. *P. major* Linn. (in part).

An almost glabrous perennial; root-stock erect, stout, truncate. *Leaves* alternate, 1-4 by 3-1 in., ovate-oblong or oblong-ovate, sub-acute or obtuse, entire or sinuate toothed, sub-coriaceous, puberulous when young, almost glabrous when mature, 3-7 nerved (commonly 5); base decurrent into the sheathing petiole upto 4 in. long. *Flowering* spikes slender, 2-6 in. long. *Corolla* lobes glabrous. *Cells* of capsule 4-8-seeded. *Seeds* angled, minute, blackish, rugose.

KHASI HILLS, (upto 5,000 ft.)

Leaves are applied to bruises and the seeds are used medicinally as a substitute for Isphagul (*Plantago ovata* forsk). Leaves and roots are used as a valuable astringent and febrifuge.

Flrs. 4-7.

ADDENDA.

Materials for the following species were obtained after the original manuscript had been sent to the press and in consequence their concise descriptions are given below. In some instances the names of the species are only mentioned

***Viburnum punctatum* Ham ex. Don.**

A stout evergreen shrub, glabrous. *Leaves* 4-8 by 1.5-3 in., coriaceous, elliptic-acuminate, almost entire, shining, clothed with orbicular multi-cellular microscopic peltate scales beneath; base narrowed into the petiole; petiole about .4-.8 in. long. *Flowers* .2 in. across, whitish, in compound terminal umbels. *Calyx* teeth minute, obtuse. *Corolla* lobes about .1 in., round. *Anther* exserted. *Drupe* about .3-.35 in. long; seeds 5-grooved with 3 grooves on the ventral and 2 on the dorsal.

ASSAM.

Flrs. 8-10 (or earlier) Fr. Cold season.

(No specimen in Forest Herbarium, Shillong. The record of this species in Assam is mentioned by Mr. D. Chatterjee, M.Sc., Royal Botanic Garden, Edinburgh).

***Geophila reniformis* D. Don.**

A slender perennial. *Leaves* .75-1.5 in., orbicular, deeply cordate, more or less pubescent; petiole 1-3 in. long. *Flowers* in 1-3 flowered pedunculate umbels. *Calyx* segments 5-7, slender, herbaceous, persistent. *Corolla* lobes 4-7, valvate. *Stamens* 4-7. *Ovary* 2-celled. *Drupe* small, globose, purplish.

SYLHET, K. & J. HILLS.

(*F.B.I.*, III, p. 178. No specimens in Forest Herbarium, Shillong).

***Petunga racemosa* K. Sch.=*P. Roxburghii* DC.**

An evergreen shrub. *Leaves* 2.5 by .7-1.5 in., thinly coriaceous; stipules deciduous; petals .25 in. long. *Flowers*

in axillary spikes. *Calyx* tube ovoid, 4-toothed. *Corolla* infundibuliform; throat villous; lobes 4. *Stamens* 4. *Berry* globose, orange yellow, 2-celled.

SYLHET (Wallich)

(*F.B.I.*, III, p. 120. No specimens in Forest Herbarium, Shillong).

***Knoxia exaltata* Griff. KHASI HILLS.**

Pavetta assamica Br., *P. neglecta* Bom. (Lushai Hills), *P. polyantha* Bom. (*P. indica* Linn. var. *polyantha* Wall) (Sylhet) are recorded from the region of this flora (Monograph of the genus *Pavetta* Fedde. Report XXXVII, 1934, p. 119.

Coffea semiserrata Colebr ex Wall. is recorded from Assam.

***Psychotria sphærocarpa* Wall.**

A glabrous shrubby plant.

SYLHET (Wallich).

(*F.B.I.*, Vol. III, p. 176. No specimen in Forest Herbarium, Shillong).

***Saprosma consimile* Kurz.**

A glabrous foetid shrub. *Leaves* 3-5 by .5-1.5 in., elliptic or lanceolate, caudate or acuminate, membranous; petiole about .2 in. *Flowers* solitary or few. *Calyx* teeth lanceolate; tube funnel-shaped. *Corolla* white, about .25 in. long. *Fruit* broadly ovoid, smooth and seed usually solitary, Kurz.

KHASI HILLS, (De Silva) upto 5,000 ft.

(*F.B.I.*, Vol. III, p. 192. No specimen in Forest Herbarium, Shillong).

Borreria stricta K. Sch. is also recorded from Assam. (D. Chatterjee, R. B. G., Edinburgh).

Valeriana assamensis Gandog. is also recorded from Assam. (D. Chatterjee, R.B.G., Edinburgh).

***Ixeris polycephala* Cass.=*Lactuca polycephala* Benth.**

A glabrous slender annual; stem herbaceous, ribbed. *Leaves* (cauline) sessile, (radical) petiolate, narrow or linear-lanceolate. *Heads* many flowered in dichotomous or sub-umbellate corymbs or panicles. *Achenes* elliptic-lanceolate, ribbed. *Pappus* silvery.

KHASI HILLS, GOALPARA.

Flrs. & Fr. Cold season.

***Lactuca hastata* DC.**

A tall and robust species. *Leaves* 1-2 by .5-.7 in. (Assam herbarium sheet) usually hastate, sharply denticulate, acuminate, hispid or pubescent. *Heads* sub-campanulate, many flowered. *Achene* obovate and elliptic.

KHASI HILLS, Nongpoh (2,500-3,000 ft.).

Flrs. 10. Fr. Cold season.

***Agapetes burmanica* W. E. Evans.**

A big straggling shrub with long loose branches, forming confused tangles on a precipitous wooded cliff, rarely more or less erect. Not epiphytic. *Flowers* pendent, singly or in bunches from the old wood. *Corolla* 2-2.5 in. long, bright rose-crimson.

Delei Valley, (900-1,200 ft.). Kingdon Ward (8124).

Allied to *A. grandiflora* Hk. f.

Flrs. 4.

***A. Parishii* Clarke.**

“Appears to be closely allied to *A. setigera* and *A. variegata* which differs principally in the apically curved corolla and fascicled inflorescence respectively.”

CACHAR, “Shapone-Kookee-poonjee,” 19th March, 1873.

***A. linearifolia* Clarke.**

An epiphytic shrub. *Racemes* axillary, corymbose, pedunculate; peduncles glabrous. *Calyx* short, somewhat cylindric. *Corolla* almost cylindric, green; style-filiform.

Mishmi Hills, Delei Valley, Kingdon Ward (8021). 'Corolla green; pedicel, calyx and ovary scarlet.'

Flrs. 4.

A. spissa *Airy-Shaw*.

A large epiphytic shrub. *Leaves* obovate. *Flowers* solitary, axillary. *Calyx* segments somewhat connate. *Corolla* white, sub-cylindric, somewhat narrowtd at the apex, 5-angulate. *Filaments* narrowly linear. *Style* filiform.

Delei Valley (2500-1800 m) Kingdon Ward (8479). "Flowers white; calyx, corolla and filaments pubescent or downy."

Flrs. 7.

(Kew Bulletin, 1935 II studies in the *Ericales* H. K. Airy-Shaw).

A. hyalocheilos *Airy-Shaw*.

An epiphytic shrub allied to *A. Griffithii* *Clarke*, but leaves are smaller, lanceolate, sub-sessile; base rotundate. *Peduncles* shorter. *Calyx* segments subulate. *Corolla* narrowly infundibuliform.

Daphala Hills.

A. Forrestii *W. E. Evans*.

"Epiphytic in the mixed forest, common on the ridge. Usually hanging down in long loose branches. *Flowers* scarlet, the points of the corolla green."

Delei Valley, (Kingdon Ward, 8061).

Rhododendron assamicus *Ward.*, *R. bulu* *Hutch.*, *R. pankimense* *Cowan ex Ward* (Mishmi Hills), *R. patulum* *Ward* and *R. kasoense* *Hutch.* are recorded from the region of this flora. (D. Chatterjee, R.B.G., Edinburgh).

Monotropa uniflora *Linn.*

A glabrous herb. *Scales* .75 in., ovate-lanceolate. *Flowers* nodding, one-flowered. *Calyx* lobes 4, resembling scales. *Corolla* lobes 5-6, ultimately deciduous, hardly

saccate at base. *Stamens* 10-12. *Ovary* 5-celled. *Capsule* globose, 5-celled, 5-valved.

KHASI HILLS—upto 6,000 ft.

Flrs. 10. Fr. Cold Season.

Primula khasiana Balf ex Smith. is also recorded from Khasi Hills.

Omphalogramma forrestii Balf. f. (distinct from *Primula*).

A single flowered ebracteate scapigerous herb. *Flowers* irregular, non-heteromorphic. *Corolla* 6-partite. *Seeds* peculiar.

ASSAM. (Kew Bulletin, 1934).

Androsace Gangnepainiana Haud-Mez.

A herb, rhizomate. *Leaves* rosulate, orbiculate, deeply cordate, 3-8 flowered, divaricate; bracts lanceolate, pilose; pedicels .2-.6 in. long, strigillose. *Calyx* .12-.17 in. long, campanulately infundibuliform; segments ovate-lanceolate. *Corolla* white or rosy, .25 in. across; tube .05 in. long; lobes somewhat obcordate. *Anthers* oblong; filaments short, thick, .02 in. long. *Capsule* globose (immature).

A. saxifragæfolia Bunge.

A glandular pubescent annual is also recorded from Assam (D. Chatterjee).

Lysimachia lobelioides Wall.

A small glabrous annual with white or pale purplish flower is also recorded from Assam (D. Chatterjee).

Ardisia Keenani Clarke.

A small shrub; branches densely rusty-villous. *Leaves* 7 by 2 in., oblong; petiole .25 in. long. *Flowers* lax in

pedunculate elongated racemes. *Calyx* segments round, short glabrous.

CACHAR, MANIPUR.

(*F.B.I.* Vol. III, p. 526. No specimen in Forest Herbarium, Shillong).

A. Helferiana Kurz.

A small shrub; branches rusty-woolly. *Leaves* 6 by 2 in., obovate-oblong. *Flowers* in axillary pedunculate sub-umbellate racemes. *Calyx* segments ovate, densely villous.

Also recorded from ASSAM.

(*F.B.I.* Vol. III, p. 526).

A. rhynchophylla Clarke.

A small shrub. *Leaves* 4·5 by 1·2 in., obovate-lanceolate, caudate-acuminate. *Flowers* white, large in shortly pedunculate few flowered racemes. *Calyx* segments elliptic, concave. *Berry* globose, smooth.

KHASI HILLS, (3-4,000 ft.).

(*F.B.I.* Vol. III, p. 529).

Mæsa populifolia Mez and **M. Kurzii Mez.** are also recorded from Assam.

Genianthus crassifolius Hk. f.

A twining shrub; young parts rusty-tomentose. *Leaves* 3-5 by 2·2·5 in., elliptic, acute or acuminate; margins recurved, coriaceous; midrib tomentose beneath; base rounded or acute. *Flowers* small in axillary dichotomously branched cymes. *Calyx* 5-partite, minutely glandular within. *Corolla* lobes 5; coronal scales over-topping the anther cells. *Stamens* 5. *Pollen* masses 2 in each cell, waxy. *Carpels* 2; stigma sub-clavate, sessile. *Fruit* of 2 slender follicles. *Seeds* comose.

SYLHET (Wallich).

(No specimen in Forest Herbarium, Shillong).

Dischidia Micholitzii Brown is also recorded from Assam.

Mitrasacme alsinoides Br.

A slender branched almost glabrous annual. *Leaves* small, about .2 to .3 in. long, scaberulous. *Flowers* white, axillary, solitary, about .1 in. across; pedicels slender. *Calyx* .08 in. *Corolla* throat hairy. *Capsule* .08 in.

ASSAM. (*F.B.I.* Vol. IV, p. 80).

Flrs. Rainy Season. Fr. 10-11.

Strychnos axillaris Colebr.

A glabrous shrub with tendril. *Leaves* 2.5 by 1 in., elliptic-acuminate; base obtuse; 3-nerved; petiole .12-.2 in. *Flowers* in small subcapitate sessile, pubescent cymes. *Corolla* villous within. *Anther* cells sparsely hairy. *Ovary* glabrous.

KHASI HILLS, upto 4,000 ft. (Wallich, Griff.).

(No specimen in Forest Herbarium, Shillong). (*F.B.I.* Vol. IV, p. 89).

S. cinnamomifolia Thw.

A climbing shrub with tendril. *Leaves* 4 by 2 in., elliptic, acute, glabrous; base obtuse, 3-5 nerved; petiole about .2 in. *Flowers* in pedunculate puberulous cymes. *Corolla* glabrous. *Anther* cells glabrous. (resembles *S. Nuxvomica*).

ASSAM.

(Mr. D. Chatterjee, R. B. G., Edinburgh, mentions this Assam record. No specimen in Forest Herbarium, Shillong). (*F.B.I.* Vol. IV, p. 89).

Fagræa Prainii Candoger is also recorded from Assam.

Cuscuta chinensis Lamk.

A leafless twining parasite. *Flowers* in dense cymes or racemes. *Calyx* segments triangular, ovate. *Corolla* lobes obtuse or bluntly acute; scales shortly fimbriate. *Ovary* obtuse; style 2, elongate; stigma capitate; fruit obtuse when young.

(*F.B.I.* Vol. IV, p. 226. No specimens in Forest Herbarium, Shillong).

(The record of this species in Assam is mentioned by Mr. D. Chatterjee, Royal Botanic Garden, Edinburgh).

***Browallia demessa* Linn.**

Rather shrubby. *Leaves* 1·5-2·5 by ·9-1·4 in., ovate, entire, sub-acute, membranous, sparsely hairy; lateral nerves slender, often arching; base rounded or cuneate; petiole ·5-1·2 in. long. *Flowers* solitary, extra axillary or in cluster of 2-3 flowers (terminal). *Calyx* hairy; segments 5. *Corolla* bluish, ·8 in. long; tube slender, ·4-·5 in. long. *Fruits* baccate, ·3 in. long (persistent calyx); seeds small, black.

Mopreng, KHASI HILLS, (5-6,000 ft.).

Flrs. & Fr. 9.

***Limnophila conferta* Benth.**

A variable plant. *Leaves* 1 by ·2 in., opposite, sessile or very shortly petioled, oblong or elliptic-oblong, obtuse, crenate-serrate, pubescent beneath; base narrowed or sub-amplexicaul. *Inflorescence* various, hairy (*flowers* solitary in Assam specimen). *Calyx* segments lanceolate, glabrate, acuminate.

AKA HILLS.

Flrs. 8.

***Vandellia hirsuta* Benth.**

An erect succulent herb. *Leaves* 1-2 in. long, ovate or oblong-obtuse, entire or sinuate, sessile (lower petioled). *Flowers* in many flowered racemes. *Calyx* segments lanceolate. *Capsule* orbicular.

AKA HILLS.

Flrs. 8.

***Verbascum Thapsus* Linn.**

A woolly herb, rather woody. *Leaves* alternate, 2-3 by ·5-·7 in. (Aka hills specimen), oblanceolate, decurrent, entire or crenate. *Flowers* in simple densely woolly spike.

Calyx segments 5. *Corolla* rotate; lobes 5. *Stamens* 5, fertile; 2 glabrous, 3 hairy. *Capsule* septicidal; seeds winged.

AKA HILLS.

Flrs. 9.

***Thunbergia alata* Boj.**

A scandent shrub, softly villous. *Leaves* ovate-cordate; petiole of the winged upto .9 in. long. *Corolla* orange-yellow.

Native of AFRICA. Cultivated and naturalised in ASSAM. AKA HILLS. (*F.B.I.* Vol. IV. p. 391).

Flrs. 8.

***Strobilanthes Wallichii* Nees.**

Shrubby; branches slender, quadrangular. *Leaves* 3 by 1 in., (1 by .5 in., Aka Hills), elliptic, acuminate, crenate-serrate, almost glabrous; lateral nerves about 6 on either half; petiole about .7 in. (upper lines almost sessile-cordate). *Flowers* solitary (Aka Hills). *Calyx* segments much elongated in fruit (about 1 in.). *Corolla* blue, about 1.4 in., almost straight. *Capsule* 4-seeded, glabrous, .5-.6 in. long; seeds pubescent.

AKA HILLS.

Flrs. 8-9.

***Justicia quinqueangularis* Kæn.**

An erect shrub or ascending from a geniculate base; stem rigid, often 5-sided. *Leaves* in distant pairs, 1.1.5 by .1 in., linear, subacute or sub-obtuse, glabrous, obscurely lineolate above. *Flowers* in terminal lax spikes; bracts linear, glabrous. *Calyx* segments linear-oblong, elongated in fruit (upto .3 in.), somewhat herbaceous. *Capsule* .2-.3 in., stout.

AKA HILLS.

Flrs. 8-9.

***Hypoestes triflora* Roem & Sch.**

Rather herbaceous. *Leaves* 2.2.5 by 1.1.5 in., ovate, crenate, or denticulate, sparsely hairy above, pubescent

beneath; petiole 1-1·2 in. long. *Flowers* in axillary or terminal capitellate clusters; bracts obovate. *Calyx* ·12 in. *Corolla* pink or white, about ·4 in. *Capsule* ·3 in., almost globose,

AKA HILLS.

Flrs. 8-9.

***Acrocephalus verbenæfolius* Wall Mss. Descript. Mukerjee.**

An erect herb; branches glandulose, sulcate, somewhat scabrid. *Leaves* sessile or subsessile, 1·2-3·2 by ·1··2 in., linear or narrowly lanceolate, acute or sometimes acuminate, dentate, somewhat strigose on both surfaces; base narrowed. *Flowers* in terminal spike, densely villous. *Calyx* ·1 in. long, campanulate, densely villous outside. *Corolla* white or pale yellow; tube slender; superior lip subequal, 4-lobed; inferior lip entire. *Filaments* anterior ·06 in. long; posterior ·05 in. long. *Style* ·1 in. long. *Nutlets* brown, very small, ovoid, minutely tubercled.

ASSAM, MANIPUR (G. Watt—Meebold) CACHAR (Praser).
(Notes, Royal Botanic Garden, Edinburgh, No. XCV. July 1938).

***Scutellaria assamica* Mukerjee.**

An erect slender herb, sparsely pilose or glabrescent. *Leaves* 1·2-2·5 by ·4-1·2 in., narrowly ovate, acuminate or sometimes acute, serrate, sparsely pilose on both sides more so on the nerves beneath; base rotundate; petiole slender, ·2-·4 in. long, rarely 1·2 in. long. *Flowers* few, in terminal lax; racemes; bracts lanceolate, entire, ciliate. *Calyx* ·1··2 in. long, densely pubescent. *Corolla* about 1 in. long, minutely pilose or glabrescent, purplish white; tube erect, gradually inflated; lobes short. *Filaments* glabrous. *Nutlets* ·05 in. across, black, tubercled.

ASSAM, upto 7,000 ft. Kohima—NAGA HILLS; MANIPUR; LUSHAI HILLS.

(Notes, Royal Botanic Garden, Edinburgh, No. XCV. July 1938).

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OF

VERNACULAR, SANSKRIT AND ENGLISH NAMES

(*Ass.* means Assamese; *Beng.* Bengali; *Cach.* Cachar or Cachari; *Duff.* Duffla; *Kach.* Kachari; *Kh.* Khasi; *Lush.* Lushai; *Manip.* Manipuri; *Mik.* Mikir; *Nep.* Nepali; *Sans.* Sanskrit; *Syl.* or *Sylh.* Sylhet; *Synt.* Synteng; *Tipp.* Tippera; *Eng.* English.)

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FLORA OF ASSAM

BY

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VOL. IV.

NYCTAGINACEÆ TO CYCADACEÆ



Published under the authority of the Government of Assam.

First correction slip to "Flora of Assam Vol. IV."

- P. 156- Read - *Reidia tetrandra* (Roxb) *M. V. Narayanswami*, n. comb. Mss., in place of "*Reidia tetrandra* (Roxb) *A. Das*, n. comb."
- P. 158- Read - *Fluggeopsis glauca* (Wall) *M. V. Narayanswami*, n. comb. Mss., in place of "*Fluggeopsis glauca* (Wall) *A. Das*, n. comb."
- P. 318- Read - *Pasania Milroyia* (Purkayastha) *A. Das*, n. comb., in place of "*Pasania Milroyia* *A. Das*, comb."

FOREWORD.

The publication of Volume IV brings the Flora of Assam to the end of Dicotyledons. Again the late Rai Bahadur U. N. Kanjilal's collections and his excellent field-notes have been of every help in drawing up descriptions of species mentioned in this volume. Of the Monocotyledons, Gramineæ have already been taken up by Dr. N. L. Bor, Forest Botanist, Forest Research Institute, DehraDun and will shortly be published as Volume V of the Flora of Assam.

In the task of publication of this volume, I had to do all the proof-reading and to make some additions and alterations here and there. Again I have to record my appreciation of the loyal assistance given by Babu Banka Bihari Syam, my Botanical Assistant. Every endeavour has been made to avoid mistakes.

Shillong,
The 26th February, 1940.

R. N. De, I.F.S.,
Botanical Forest Officer.

PREFACE

It is with great pleasure that the fourth volume of the "Flora of Assam" (Apetalæ & Coniferæ) is presented to the public. The original manuscript of this volume was completed by me in December, 1934. Mr. P. C. Kanjilal, B.Sc., I.F.S. (now of U. P.) offered his ungrudging help and assistance in the preparation of this work, particularly in dealing with *Lauraceæ* a rather difficult family. Exhaustive, accurate and elaborate field-notes of the late Rai Bahadur U. N. Kanjilal have been freely utilised and reproduced in the descriptions, although in most cases they have been drawn up with reference to the living plants or to the herbarium specimens or to both. Addition of fresh materials and revision of my original manuscript continued over a period of about 18 months, and I am glad that I have been able to complete the manuscript in time for its publication within the current year. In course of this work, it was absolutely necessary to make many references to Kew, Sibpur, Edinburgh and DehraDun. I had to run down occasionally to Calcutta to work in the Herbarium of the Royal Botanic Garden, Calcutta, in order to be conversant with the changes in nomenclature and to draw up and check descriptions of new species and new records with reference to literature and by examining actual specimens preserved there. Such a step on my part has told upon my advanced age and my purse in my retired life.

Several species (not previously included) have also been added to this work in smaller types or without serial number. This procedure had to be adopted in order to avoid alterations in the generic and specific Keys. It is, however, not claimed that the compilation of the "Flora" is fully comprehensive. Omission in this volume of a number of species of herbs, shrubs and trees could not be avoided. Attempt has, however, been made to raise the standard of this volume. It is impossible to do justice to a work of this

nature without proper facilities for ready reference, which unfortunately have not been available for me.

I wish to record my sincere thanks and indebtedness to all the botanists, who have rendered assistance in various ways in the compilation of this Volume.

- (1) Prof. Sir W. W. Smith, Regius Keeper, Royal Botanic Garden, Edinburgh.
- (2) Mr. C. E. C. Fischer, Royal Botanic Garden, Kew.
- (3) Director, Royal Botanic Garden, Kew.
- (4) Superintendent, Royal Botanic Garden, Sibpur.
- (5) Forest Botanist, Forest Research Institute, DehraDun.
- (6) Prof. B. H. Danser, Groningen.
- (7) Mr. M. V. Narayanswami, Royal Botanic Garden, Sibpur.
- (8) Dr. D. Chatterjee, M.Sc., Ph.D. (Edin.).

I must acknowledge my grateful thanks to Mr. R. N. De, B.Sc., I.F.S., Forest Botanist, Assam, who is officially in-charge of the publication of this work for going through the proofs, and also to Babu Banka Bihari Syam who has been associated with this publication for a considerable period, as Assistant to Forest Botanist, Assam.

It now remains to acknowledge my thanks and indebtedness to my friend Dr. K. P. Biswas, M.A., D.Sc., F.R.S.E., Superintendent, Royal Botanic Garden, Calcutta, for his ungrudging assistance in various ways.

In spite of repeated proof-reading, it has not been practicable to avoid printer's mistakes, which is very much regretted.

It is a great relief to me that my labours for the last five years (after my retirement) have come to a successful termination, with the publication of this Volume. It will now rest with my successors to take up the Monocotyledons. I have much pleasure in announcing here that the grasses of Assam have been described by Dr. N. L. Bor and it is now passing through the press.

Royal Botanic Garden, Calcutta,
The 24th February, 1940.

A. Das.

INTRODUCTION.

Thirty-three families, 184 genera and about 585 species are embodied in this Volume. Phœbes of Assam (Published in the Assam Forest Records, Botany, Vol. II, 1937) which were revised by me, are now reproduced in this work.

The following new species which were discovered in the Shillong Herbarium, Assam, from the region of this "Flora" are also incorporated here.

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Warburg for the Assam species. Warburg's specific names have however been mentioned separately.

A new genus *Purkayasthæa* (Lauraceæ) established by Mr. C. S. Purkayastha and Mr. Narayanswami also finds its proper place.

Hernandiaceæ has been put under Calycifloreæ by some botanists but its position under Apetaleæ has been retained here.

Full advantage has been taken of the publications on Loranthaceæ by Prof. B. H. Danser, Groningen. He has very kindly examined the Assam sheets and rendered valuable assistance to me for adopting modern names for the Assam species. The genera *Hyphear*, *Helixanthera*, *Scurrula*, *Taxillus*, *Dendrophthæ*, *Tolypanthus* and *Macroselon* for *Loranthus* and *Kortalsella* *opuntia* for *Viscum opuntia* have been introduced in this publication. A new variety of *Viscum album*, viz-var—*meridianum* and a new species *Taxillus assamicus* have been recently identified and described by Prof. Danser from the Assam sheets sent to him but unfortunately they could not be incorporated. I am particularly grateful to Prof. Danser for his valuable co-operation.

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It has been realised that the compilation of a work of

such a magnitude should have been undertaken at the Royal Botanic Garden, Sibpur, where adequate facilities are conveniently available for ready reference to complete literature and examination of herbarium specimens. The defects now noticeable in the volumes of the "Flora of Assam" could thus have been undoubtedly minimised.

Royal Botanic Garden, Calcutta,
The 24th February, 1940.

A. Das.

nature without proper facilities for ready reference, which unfortunately have not been available for me.

I wish to record my sincere thanks and indebtedness to all the botanists, who have rendered assistance in various ways in the compilation of this Volume.

- (1) Prof. Sir W. W. Smith, Regius Keeper, Royal Botanic Garden, Edinburgh.
- (2) Mr. C. E. C. Fischer, Royal Botanic Garden, Kew.
- (3) Director, Royal Botanic Garden, Kew.
- (4) Superintendent, Royal Botanic Garden, Sibpur.
- (5) Forest Botanist, Forest Research Institute, DehraDun.
- (6) Prof. B. H. Danser, Groningen.
- (7) Mr. M. V. Narayanswami, Royal Botanic Garden, Sibpur.
- (8) Dr. D. Chatterjee, M.Sc., Ph.D. (Edin.).

I must acknowledge my grateful thanks to Mr. R. N. De, B.Sc., I.F.S., Forest Botanist, Assam, who is officially in-charge of the publication of this work for going through the proofs, and also to Babu Banka Bihari Syam who has been associated with this publication for a considerable period, as Assistant to Forest Botanist, Assam.

It now remains to acknowledge my thanks and indebtedness to my friend Dr. K. P. Biswas, M.A., D.Sc., F.R.S.E., Superintendent, Royal Botanic Garden, Calcutta, for his ungrudging assistance in various ways.

In spite of repeated proof-reading, it has not been practicable to avoid printer's mistakes, which is very much regretted.

It is a great relief to me that my labours for the last five years (after my retirement) have come to a successful termination, with the publication of this Volume. It will now rest with my successors to take up the Monocotyledons. I have much pleasure in announcing here that the grasses of Assam have been described by Dr. N. L. Bor and it is now passing through the press.

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INTRODUCTION.

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FLORA OF ASSAM

APETALÆ.

FAM. 103. NYCTAGINACEÆ.

Herbs less often shrubs or trees. *Leaves* usually opposite, exstipulate. *Flowers* hermaphrodite, rarely unisexual, regular; bracts often involucrate, free or connate. *Perianth* gamophyllous, usually petaloid, lower portion persistent, enclosing the fruit; limb 3-5 lobed; lobes plicate in bud. *Petals* 0. *Stamens* hypogynous; filaments usually unequal, inflexed in bud, usually connate at the base; anthers didymous. *Ovary* 1-celled, free; ovule solitary, erect, basal; style involved in bud. *Fruit* dry, indehiscent, enclosed in the coriaceous perianth base; albumen soft or flowery. *Radical* inferior.

A family of very little forest importance. The following plants may however be mentioned :—

***Bœrhaavia diffusa* Linn.** Syn. *B. repens* Linn. Var. *diffusa* and *procumbens* Hk. f. in F.B.I. *Punarnava*. *Shothaghni*, Sans. Vern. *Punarnava*, Beng.

A diffuse herb with stout fusiform roots; stems ascending or prostrate, divaricate, thickened at the nodes. *Leaves* in unequal pairs, the larger 7-1 in., the smaller about half the size, ovate or orbicular-ovate, rounded or acute at the apex, glabrous and dark green above, undersurface whitish, with minute scales; petiole slender, variable in length. *Flowers* very small, dark pink, subsessile or sessile, upto 10 together, sub-capitately arranged on long peduncled dichotomously branched panicles; pedicels capillary; bracts small. *Perianth* about 12 in. long, glandular outside; limb funnel-shaped with 5 vertical bands outside; lobes 5. *Stamens*

usually 2, slightly exserted. *Fruit* about .1 in. long, 5-ribbed, glandular; embryo hooked, radical long.

A common waste land weed of the plains, (upto 3,000 ft.).

The plant is valued, in the indigenous medicine from time immemorial and is indicated for the treatment of dropsy, jaundice, urino-genital diseases. The tender leaves are eaten as pot herb.

Flrs. 4-6. Fr. 7-8.

Bougainvillea spectabilis Willd.

▲ large more or less thorny scrambling shrub with pubescent branches. *Leaves* alternate, 1-2 in. long, elliptic or ovate, acuminate, pubescent; petiole upto .5 in. long. *Flowers* in threes; perianth tubular, each adnate to a very conspicuous magenta coloured bract.

A native of Brazil and now commonly grown in gardens where it is trained over trellises, archways, etc. The plant is a perfect blaze of colour when in flower.

Var. *lateritia* has brick red bracts.

B. *glabra* Choisy. Similar to the above; branchlets and leaves glabrous. *Leaves* lanceolate; petiole upto .3 in. long; bracts larger than in the last species.

Commonly grown in the plains.

***Mirabilis jalapa* Linn.** The Marvel of Peru. Vern. *Krishnakali*, *Sarpamani*, Beng.

A large fruticose herb with soft stems with swollen joints, broadly ovate-acuminate leaves, many coloured flowers varying from white and yellow to shades of red and black rugose seeds.

Grown all over the province, often found as an escape.

FAM. 104. AMARANTACEÆ.

Herbs, rarely shrubs or undershrubs, erect or climbing (rarely). *Leaves* opposite or alternate, exstipulate. *Flowers* usually 2-sexual, rarely polygamous or dioecious, small, usually in terminal and axillary simple or panicked spikes, cymes or clusters, the outermost flowers of a cluster sometimes deformed; bracts hyaline or scarious; bracteoles 2, scarious. *Perianth* persistent, usually of 5, free or connate,

scarious or hyaline, segments imbricate in bud. *Stamens* 1-5, opposite the perianth segments; filaments free or connate below or united with intervening membranous staminodes and forming hypogynous cup; anthers 1-2 celled. *Ovary* 1-celled; ovules 1 or more; style usually obsolete, simple or 2-3 cleft. *Fruit* a membranous utricle, rarely an irregularly dehiscent capsule or a berry, often enclosed in or supported by the persistent perianth. *Seed* orbicular or reniform, compressed, embryo annular or curved; albumen mealy, cotyledons linear.

Leaves alternate or alternate and opposite mixed :—

- | | |
|--|-----------------------|
| Flowers in spicate racemes not dense, staminodes 0; fruit baccate, glabrous or nearly so. | 1. <i>Deeringia</i> . |
| Flowers in dense spikes, staminodes interposed between the stamens; fruit dry, more or less tomentose. | 2. <i>Ærua</i> . |

Leaves all opposite :—

- | | |
|--|-------------------------|
| Flowers in clusters which are arranged in spikes; each cluster containing one perfect and several sterile flowers, which are reduced to single perianth segments with hooked awns. | 3. <i>Cyathula</i> . |
| Flowers all perfect, arranged singly in spikes. Sepals spinescent. | 4. <i>Achyranthes</i> . |
| Flowers in paniced spikes. Sepals scarious tipped with wool. | 5. <i>Stilbanthus</i> . |

1. DEERINGIA R. Br.

Deeringia amranthoides (Ham) Merr = *Deeringia celosioides* R. Br. Vern *Monbir*, Mech; *Handing*. Mik.; *Madhu-holong*, *Mathukthuka*, *Rangoli-lota*, *Man-mani*, Ass.; *Soh-lang-krem*, Kh.; *Ako-ligbo-riube*, Abor; *On-ligbo-riube*, Miri; *Midoubri-doukha*, Cach.; *Mei-hur-jarem*, *Mei-soh-jarem*, Khasi.

A subscandent or rambling shrub with long weak branches; bark greenish-grey, warty. *Leaves* alternate, 2-5 by 1-2 in., ovate or ovate-lanceolate, acuminate, entire, glabrate, membranous, secondary nerves 7-9 on either side, arched; base often unequal, rounded or narrowed into the petiole, usually abruptly; petiole upto 1 in. long. *Flowers* greenish, close together on spike-like paniced or simple

racemes up to 12 in. long; pedicels filiform, .05-.1 in. long; bracts and bracteoles minute, ovate-acuminate. *Perianth* of 5 segments each .06-.8 in. long, oblong, scarious on the margins. *Stamens* 5, exserted, somewhat dilated and united at the base. *Style* short; stigmas 3, dilated at the tips narrowed downwards; ovules on long funicles from the base. *Fruit* a globose scarlet, succulent berry, .2 in. across, seated on the spreading perianth; seeds minute, black.

Throughout the area ascending to about 3,000 ft. in the KHASI HILLS.

The leaves and roots are said to be medicinal. The juice of the ripe fruits can be used as substitute for red ink, very pretty when in fruit.

Flrs. 8-10, sometimes earlier. Fr. 11-12.

2. *ÆRUA* Forsk.

Ærua scandens Wall.

A subscandent or straggling undershrub with striate pubescent branches. *Leaves* alternate and opposite, variable in size, usually 1-4 by .5-1.5 in., elliptic or ovate-lanceolate, acute, mucronate, adpressed pubescent in both surfaces, more densely beneath, narrowed at the base into the petiole, which is up to .5 in. long. *Flowers* white with a greenish centre in axillary and terminal ovoid or cylindrical compact spikes .25-1 in. long, often 2-3, sometimes more together, usually forming lax panicles; bracteoles minute, ovate-acuminate, hyaline. *Perianth* lobes 5, about .1 in. long, lanceolate-acuminate, villous outside, scarious. *Stamens* 5, alternating with linear staminodes and connate with them below in a cup. *Style* simple; stigmas 2-fid, capitellate; ovule 1, pendulous from a basal funicle. *Fruit* a membranous broadly ovate capsule with a coriaceous circumsciss crown.

Plains of ASSAM—Hooker.

Flrs. and Fr. almost all the year round.

3. *CYATHULA* Lour.

Cyathula tomentosa Moq. Vern. *Soh-pyrtit*, Synt.

A densely tomentose or woolly suberect undershrub, up to 4 ft. in height; stems usually woody at the base; branches

swollen at the nodes. *Leaves* opposite, variable in size, 2-7 in. long, elliptic to elliptic-lanceolate, acute or acuminate; base narrowed or cuneate, adpressed pubescent or glabrate above, silky tomentose beneath; main lateral nerves 6-9 on either side; petiole up to 1 in. long. *Flowers* clustered, clusters collected in dense globose heads .5-.75 in. across, which are arranged on peduncled spikes up to 12 in. long, the lower portion of which is often interrupted; spikes much abbreviated, sometimes consisting of a solitary head when axillary; 1-2 flowers in each cluster, perfect, the rest imperfect. *Bracts* and bracteoles concave, ovate in outline, cuspidate, hairy on the back, .1-.15 in. long. *Perianth* segments of perfect flowers about .2 in. long, scarious, linear-lanceolate, 2 or all ending in rigid hooked awns, enlarged in fruit; those of the imperfect flowers reduced to a single perianth segment with hooked awn. *Stamens* 5, alternating with 5 lacerate staminodes and connate with them at the base into membranous cup. *Ovary* obovoid; style simple; stigma capitellate; ovule solitary. *Fruit* an indehiscent, ovoid, membranous utricle, enclosed in the perianth surmounted by the remains of the style; seeds oblong, testa light brown, coriaceous.

KHASI AND JAINTIA HILLS, 2-5,000 ft.

Flrs. 7-8. Fr. 11-12.

C. prostrata Blume.

A slender annual herb. *Leaves* elliptic-rhomboid or ovate, 1-2.4 in. long, acute, both surfaces strigosely hispid; petiole very short; sometimes *O.* *Flowers* pale violet in small drooping clusters arranged in spicate pedunculate racemes. *Perianth* lobes of the 2-3 perfect flowers 5. lanceolate-acuminate, hispid, upto .1 in. long; those of the imperfect flowers similar or reduced to hooked awns. *Staminodes* 2-fid or retuse.

KHASI HILLS (3,000 ft.) Clarke (No. 5442) SYLHET, MANIPUR (according to Roxburgh this plant has been introduced from the Molucca).

Flrs. 9. Fr. 11.

4. ACHYRANTHES Linn.

Herbs, sometimes woody below. *Leaves* opposite; petiole entire. *Flowers* 2-sexual in slender simple and pani-

oled spikes, soon deflexed; bracts membranous, spinescent, persistent on the rachis; bracteoles 2, spinescent. *Perianth* segments 5, shining, lanceolate, aristate, rigid, more or less connate below, ultimately hardened. *Stamens* 2-5; filaments filiform, connate at the membranous base and alternating with as many square staminodes which are toothed, lacerate or with a toothed scale at the back; anthers 2-celled. *Ovary* oblong, sub-compressed, 1-selled; style filiform; stigma capitellate; ovule solitary. *Fruit* an oblong or ovoid utricle; seed oblong, testa coriaceous.

Bracteoles with ovate blade, at least half the length of the awn; staminodes red. 1. *A. aspera*.

Bracteoles reduced to awns, with minute auricles on either side; staminodes greenish. 2. *A. bidentata*.

1. **Achyranthes aspera** Linn. Vern. *Apamarga*, Sans.; *Champang-michel*, Garo; *Sam-songi*, Cach.; *Chik-kai-rek*, Kuki; *Non-phak-pe*, Mik.; *Soh-byrthied*, Kh.; *Ulti-hot*, Ass.; *Apang*, Beng.; *Chit-chita*, Hind.

An erect undershrub or herb attaining about 3·5 ft., lower portion perennial; branches pubescent, striate. *Leaves* opposite, very variable, 1-5 in. long, elliptic-obovate or sub-orbicular, abruptly acuminate, subacute or rounded at the apex, narrowed at the base, softly adpressed hairy on both surfaces or glabrate above; main lateral nerves 6-8 on either half; petiole channelled above, upto ·5 in. long. *Flowers* greenish, polished, soon stiffly deflexed, in simple or paniced, pubescent spikes, which elongate in fruit; bracts ovate, aristate, membranous, persistent, reflexed in fruit, upto ·15 in. long; bracteoles with a hardened base, broadly ovate blade and an excurrent spinescent awn which elongate considerably in fruit ·15-·2 in. long, deciduous with the perianth. *Perianth* lobes 5, upto ·25 in. long, subequal, lanceolate, with membranous margins, hardened in fruit. *Staminodes* fimbriate; filaments and fringe of staminodes pink; utricle oblong, about ·1 in. long.

A common undergrowth throughout the area ascending to 5,000 ft.

A troublesome undergrowth when in fruit on account of the sharp spiny bracteoles and pungent tips of the perianth which stick to

clothes and prick the skin. The fruiting perianth together with the bracteoles become detached with the fruit while the bract persists.

The plant is valued in Indian medicinal practice for various ailments. The ash yields a large quantity of potash.

Flrs. 6-10. Fr. 12.

2. *Achyranthes bidentata* Blume.

A suberect herb with a perennial and more or less woody rootstock; branchlets striate, pubescent. *Leaves* 2·5-6 by 1·2-2 in., lanceolate to elliptic, often with undulate margins, acuminate, thinly pubescent to glabrate; lateral nerves 6-9 on either side; petiole upto ·7 in. long. *Flowers* in terminal and axillary paniced spikes. *Bracts* ovate, awned, about ·15 in. long; bracteoles often exceeding the bracts consisting of a spinose awn with two membranous auricles at the base. *Perianth* segments about ·15 in. long, ovate-oblong, acuminate, hardened in fruit; filaments and staminodes greenish, not pink, as in the last species. *Utricle* oblong, enclosed in the hardened perianth.

Scarcely more than a variety of the last species.

KHASI HILLS, probably also elsewhere in the province.

Flrs. 6-10. Fr. 7-12.

A. *aquatica* Br.

A stout aquatic herb. *Leaves* 2-6 in. long, narrow to elliptic-lanceolate, strigosely tomentose, spikes villous, elongating considerably in fruit. *Perianth* lobes unequal, outer spinous tipped and exceeding the remaining 4, which are not spinose.

Swamps in the plains (SYLHET).

Flrs. Rainy season, Fr. 11.

5. STILBANTHUS Hook f.

Stilbanthus scandens Hk. f.

A large woody climber; branches soft, obtusely 4-angled; branchlets silky. *Leaves* opposite, 4-6 by 2-3 in., elliptic-acuminate, pubescent or glabrate on both surfaces; petiole ·5-1 in. long. *Flowers* white, shining, in pubescent spikes, 1-3 in. long, arranged in spreading terminal trichotomously

branched panicles; bracts small, ovate, villous; bracteoles usually a little longer. *Perianth* segments 5, .5 in. long, sacrious, narrowly ovate-lanceolate, bearded outside at the tips. *Stamens* 5, alternating and connate at the base with lacerate staminodes, which are longer than the slender, hairy filaments. *Style* simple; ovule 1, pendulous from a long basal funicle. *Utricle* indehiscent, oblong with villous top.

NAGA HILLS, (upto 5,800 ft.) Clarke (41177 D.), Prain.

Flrs. Rainy season. Fr. 10.

Amaranthus gangeticus Linn. Vern. *Moricha-hag*, Ass.; *Noteshak*, *Dengua-shak*, Beng.; *Chaulai*, *Marsa*, *Chua*, Hind.

An erect often stout herb attaining 5 ft. in height in some varieties, green or bright pink (in var. tricolor variously coloured). *Leaves* ordinarily 2-6 by .8-4 in., ovate, oblong or lanceolate, decurrent at the base into the petiole, glabrous. *Flowers* 1-sexual, small in clusters, congested on the axils or forming simple more or less interrupted spikes. *Bracts* about .15 in. long, hyaline, awned; bracteoles somewhat shorter. *Perianth* segments about .15 in. long, awned, those of the male flowers shorter. *Stamens* 3; seed solitary, compressed, black.

The plant has many varieties and local races; the leaves are used as pot herb and the young stems as vegetable, being eaten like *Asparagus*.

A. caudatus Linn. Love-lies-bleeding.

An erect herb with elliptic-obtuse leaves; spikes arranged in drooping crimson or yellow panicles.

Commonly grown as an ornamental plant.

Some varieties of this plant are grown for their leaves, which are eaten as *sag* and also for the farinaceous seeds in N. W. INDIA.

A. spinosus Linn. Vern. *Kanta-natia*, Beng.; *Kanta-maricha*, Ass.; *Tanduliya*, Sans.

An erect glabrous much branched weed armed with sharp axillary spines. *Leaves* upto 3 in. long, ovate or oblong-lanceolate, cuneate at the base. *Flowers* 1-sexual in axillary clusters, and in terminal and paniced or simple axillary spikes. *Bracts* exceeding the perianth segments, awned; perianth segments 5.

Very common.

The tender shoots are eaten.

Flrs. and Fr. almost throughout the year.

A. hypochondriacus Linn. The Prince's feather.

A handsome plant with crimson stems, leaves and flowers. Cultivated as an ornamental plant in gardens.

Celosia argentea Linn.

An erect glabrous annual 1-3 ft. high with linear or lanceolate 1-5 in. long and white, pink scarious flowers in spikes.

A common waste land weed originally introduced.

Seeds are officinal being an efficaceous remedy in diarrhœa.

Var. cristata. Syn. *C. cristata* Linn. Cock's comb., Vern. *Moragphul*, Beng.

Leaves broad, spikes often much developed curiously branched and monstrosous, purple, pink or yellow.

Commonly cultivated in gardens.

The flowers are considered astringent and are used in diarrhœa and in excessive menstrual discharges.

Gomphrena globosa Linn. The Globe Amaranth.

Flowers in dense globose many coloured heads. Often grown during the rainy season for the bright coloured flower heads which range from yellowish white through various shades of red to purple.

Telanthera ficoidea Moq.

A native of Brazil, often used for edgings in garden beds. *Leaves* small, close, opposite, often coloured red or purplish.

FAM. 105. CHENOPODIACEÆ.

Herbs or shrubs, often fleshy and glaucous. *Leaves* usually alternate, simple, exstipulate. *Flowers* small, often dimorphic, 1 or 2 sexual, usually green and regular; bract 1 or none; bracteoles 1 or 2. *Perianth* persistent, often accrescent in fruit of 3-5 free or connate lobes, imbricate in bud, sometimes wanting in female flowers. *Stamens* usually 5, opposite the perianth segments; perigynous or hypogynous; filaments free or connate at the base, sometimes with intraveneing staminodes. *Ovary* 1-celled; style terminal, long or short; stigmas 2-5, free or slightly united, less often solitary; ovule solitary, basal or lateral. *Fruit* usually an utricle, rarely capsular, often enclosed in the enlarged sometimes fleshy perianth. *Testa* of seeds crustaceous, coriaceous

or membranous; endosperm floury, fleshy or 0; embryo usually peripheral, surrounding the endosperm.

Chenopodium ambrosiodes Linn. Mexican tea.

An erect branchy, strongly smelling undershrub or perennial herb attaining about 4 ft., with sulcate glandular-hairy and minutely cobwebby pubescent stems. *Leaves* smaller upwards, lower attaining 2·5 in., oblong or lanceolate, obtuse, sinuate-toothed, upper entire; base decurrent into the short petiole. *Flowers* minute, sessile, clustered on axillary and terminal simple or paniced spikes in the axils of foliaceous bracts, which increase in size downwards, the whole of the upper portion of the plant being converted into a leafy panicle when flowering. *Perianth* segments usually 4-5, rarely 6, elliptic-acute, connate below, valvate, incurved. *Stamens* 4-6, hypogynous. *Ovary* globose; stigmas 3-5, very minute. *Utricle* enclosed by the persistent perianth; seed brown.

NOWGONG, SYLHET, KHASI and JAINTIA HILLS, in low elevations and probably throughout the province.

The plant is said to yield an essential oil which is regarded as tonic and antispasmodic. It has a reputation as a useful remedy in nervous affections.

Flrs. & Fr. almost all the year round.

C. album Linn. Vern. *Bathuagsak*, Beng.

An erect herb usually coated with a mealy substance, stems and inflorescence sometimes tinged with purple or red. *Leaves* very variable, smaller upwards, the lower attaining in cultivation 4-6 in. in length; oblong-lanceolate to rhomboid-lanceolate, more or less toothed or lobulate. *Flowers* minute, bisexual, green in spikes, which are usually paniced.

A weed of cultivation ranging to the hills, also sometimes cultivated.

The leaves are eaten as pot herb and are said to be rich in mineral matters specially potash and also contain a considerable amount of albuminoids and other nitrogenous compounds.

Flrs. & Fr. 3-6 according to elevation.

Beta vulgaris Linn. The beetroot. Vern. *Beetpalang*, Beng.

The well-known vegetable developing large edible red root in cultivation. *Leaves* oblong, ovate or rhomboid-ovate, obtuse; base decurrent on the petiole. *Flowers* 2-sexual, in distant clusters, with narrow bracts arranged in leafy paniced spikes.

Often cultivated.

A variety described as a species by Roxburgh—*B. bengalensis* Roxb. and with white, rather stringy roots is the country spinach.

Vern. *Palang* which is largely grown for the leaves, which are eaten as vegetable.

Spinacia oleracea Linn. Spinach. Vern. *Palang*, Beng.; *Mitha-palang*, Ass.; *Palak*, Hind.

A well-known vegetable with deltoid ovate, or pinnatifidly lobed leaves. *Flowers* ebracteate, diœcious. *Fruit* prickly or smooth; utricle adnate to the perianth.

Often cultivated in gardens.

Atriplex hortensis Linn. Orache, Mountain spinach. Vern. *Paharipalang*, Beng., Ass. & Hind.

A stout erect annual with glabrous striate stems. *Leaves* upto about 2·5 in. long, ovate or upper triangular, obtuse. *Flowers* monœcious; female without perianth; utricle membranous, enclosed in the hardened bracteoles.

Cultivated and prized as a vegetable in the KHASI HILLS and also in many districts in the plains.

Basella rubra Linn. Vern. *Pui*, Beng. & Ass.; *Poi*, Hind.

A glabrous climber with fleshy twining stems often tinged with red. *Leaves* 2·5 in. long, broadly ovate to orbicular, shining. *Flowers* 2-sexual, red or white in lax peduncled spikes 1·6 in. long; each with a small green bract and 2 adnate fleshy bracteoles. *Utricle* size of a small pea, included within the fleshy perianth which is black with red or purplish juice.

Cultivated, often apparently wild near hedges. It is largely used as a vegetable.

Boursingaultia baselloides Kunth.

A glabrous, often extensive twiner; old stems warty bearing ovoid tubercled bulbils; herbaceous portions of stems dying back every year. *Leaves* 1·5-3 in. long, fleshy, broadly ovate, acute or sub-acute, fleshy; base sub-cordate or cuneate, decurrent at the base to the short petiole. *Flowers* white, 2-sexual, about ·2 in. across, faintly scented, in terminal and axillary elongate lax, paniced or simple spike-like racemes; bracts subulate, shorter than the pedicels; bracteoles ovate, hyaline, connate into a cup. *Perianth* consisting of an outer whole of 2 sepals, adnate to an inner corolline whorl of 5 segments connate at the base, elliptic; stamens 5, perigynous; style with 3 capitellate stigmas. *Fruit* not seen.

Introduced from S. AMERICA and now wild near habitations in Shillong.

Very ornamental when in flower, masses of white sprays of which cover the supporting object. The fleshy leaves are used as a vegetable.

Acroglochin chenopodioides Schr.

An erect glabrous annual. *Leaves* alternate, 1-1.5 by .4-.6 in., elliptic-lanceolate, sharply denticulate, acute or acuminate; base acute; petiole .2-.4 in. long. *Flowers* minute, clustered in axillary cymes; perianth segments 5, sub-acute, green. *Stamens* 1-3; filaments dilated below. *Ovary* depressed; style short; stigma 2, subulate; ovules erect. *Utricle* disciform.

KHASI and JAINTIA HILLS, (Shillong Peak 6,000 ft.).

Flrs. Rainy season. Fr. Later.

FAM. 106. PHYTOLACCACEÆ.

Trees, shrubs or herbs. *Leaves* alternate, entire; stipules small or 0 or reduced to tubercles. *Flowers* usually in racemes, bracteate, 2-bracteolate. *Perianth* 4-5, imbricate, petaloid or sepaloid, sometimes unequal. *Stamens* 4-5 or more; filaments free or slightly connate at the base; anthers deciduous, 2-celled. *Ovary* usually superior; ovule solitary in each carpel or 1 or small; carpels free or connate. *Fruit* fleshy or dry, baccate or samaroid or utricular. *Seeds* erect, often arillate; albumen fleshy; embryo peripheric.

PHYTOLACCA Linn.

Phytolacca acinosa Roxb. Vern. *Jaiong*, Kh.

A succulent herb. *Leaves* 2-7 by .6-2.5 in., elliptic or obovate, acuminate, entire, membranous, narrowed into the petiole, .3-1 in. long. *Flowers* 1-2 sexual in peduncled racemes; perianth sepaloid. *Ripe fruit* (carpels about 10) blue-black.

KHASI & JAINTIA HILLS, (upto 5,500 ft.).

The leaves are eaten cooked as a spinach.

Flrs. & Fr. 5-8.

FAM. 107. POLYGONACEÆ.

Herbs or shrubs, rarely trees. *Leaves* alternate, rarely opposite, usually entire, sometimes serrulate; stipules usually membranous and forming a tube encircling the stem (ochrea). *Inflorescence* axillary, racemose, spicate, capitate or paniculate. *Flowers* usually bisexual, joined on the pedicel; perianth segments 3-6, free or somewhat connate, imbricate in bud, persistent. *Stamens* usually 5-8, rarely more or fewer, perigynous. *Disk* annular, glandular or absent. *Ovary* free, 2-4 gonous or biconvex; styles 1-3; stigmas various, usually capitellate; ovule 1, orthotropous; but hard, usually 3-(rarely 4-) gonous or biconvex, usually included in the perianth. *Seed* erect with membranous testa and floury or sometimes miniate albumen. *Radicle* superior.

Perianth segments 3-5; stigmas capitellate :—

Stamens 5-8 or fewer; nut enclosed in the perianth or slightly extruded; cotyledons flat.

1. Polygonum.

Stamens 8; nut much extruded; cotyledons plaited.

2. Fagopyrum.

Perianth segments 6; stamens 6; stigmas fimbriate.

3. Rumex.

1. POLYGONUM Linn.

Herbs or shrubs. *Leaves* alternate, entire, rarely lobed; stipules tubular, usually membranous, sometimes herbaceous, rarely minute and 2-fid. *Flowers* 2-sexual, small or minute, clustered, clusters axillary or terminal, or in spiciform, often panicled or sometimes capitate racemes. *Bracts* and bracteoles ochreate. *Perianth* 4-5, rarely 3-cleft, 2 outer segments smallest. *Stamens* 5-8, perigynous, usually with minute yellowish glands between the bases of filaments (disk); anthers often pink or purple. *Ovary* compressed or trigonous; styles 2-3; stigmas capitellate. *Nut* included in the more or less accrescent perianth or slightly extruded, biconvex or trigonous, brown or black usually polished.

I. Unarmed :—

- A. Flowers in axillary clusters; perianth 5-cleft; stamens 8; styles 3, nut trigonous. A low undershrub or herb. .. 1. *P. plebejum*.
- B. Flowers in racemes :—
1. Racemes slender :—
- Stamens 5; styles 2, hooked, nut flattened, more or less hairy tall plant with herbaceous stems. .. 2. *P. virginianum*.
- Stamens 6-8; styles not hooked; nut biconvex, not flattened. Entire plant glabrous. A stout herb with woody rootstock. .. 3. *P. glabrum*.
2. Racemes spiciform, dense :—
- A scapigerous perennial herb with a woody rootstock. .. 4. *P. paleaceum*.
- C. Flowers clustered in heads :—
1. Peduncles corymbosely arranged or paniced :—
- A climber, or erect or rambling shrub. .. 5. *P. chinense*.
2. Peduncles 1-3 together, terminal or axillary :—
- (a) Stem creeping on rocks and banks and rooting adventitiously. .. 6. *P. capitatum*.
- (b) A herb about 2-3 ft. high, with woody root stock. .. 7. *P. microcephalum*
- D. Flowers in large terminal and axillary panicles; shrubby plants. Entirely glabrous; nut included within the perianth. .. 8. *P. paniculatum*.
1. Hairy plants :—
2. Branches and petioles strigose with deflexed hairs, undersurface of leaves not silky; investing hairs somewhat harsh, nut not included in the perianth. .. 9. *P. rude*.
- Hairs on the branches and petioles never deflexed; undersurface of leaves silky; investing hairs soft; nuts included. .. 10. *P. molle*.

II. Armed with recurved prickles :—

- Climber or with rambling stems.
Leaves peltate; stipules foliaceous. .. 11. *P. perfoliatum*.

1. *Polygonum plebejum* Br.

An undershrub or herb attaining about 2 ft. with many sub-erect or prostrate stems; branches striate, terete, glabrous or strigillose along the striations when young. *Leaves* very variable, usually .2-1.2 in. long, linear or linear-oblong, acute or obtuse, margins often revolute; lateral nerves obscure, sessile or nearly so; stipules lacerate to more than half the length and fimbriate. *Flowers* about .1 in. long, pink or greenish, axillary, solitary or 2-4 together, sessile or shortly pedicellate. *Perianth* 4- or 5- partite. *Nut* triquetrous, shining.

Throughout the area.

A very variable plant, with many varieties.

Flrs. 3-7. Fr. 11.

2. *Polygonum virginianum* Linn.

A tall sub-herbaceous plant 2-5 ft. or more in height with hollow stem and woody rootstock; young shoots hispid. *Leaves* thin, 4-7 by 1.5-3 in., sometimes larger, elliptic or elliptic-lanceolate, acuminate, narrowed or acute at the base, thinly clothed with long stiff adpressed hairs on both surfaces, margins ciliate; lateral nerves 9-11 on either side; petiole .4-.7 in. long; *stipules* hirsute with spreading hairs upto .5 in. long. *Flowers* red, in slender often branched terminal or simple axillary racemes 6 to 16 in. long; bracts ciliate, about .15 in. long, basal portion tubular; pedicels rigid and stout in fruit. *Perianth* 4-partite, thin, .15 in. long, elliptic or ovate, obtuse, eglandular. *Stamens* 5; styles 2, free, rigid, hooked, persistent and extruded in fruit. *Nut* flattened, ellipsoid, .08 in. long.

Nongstoin, 5,000 ft. KHASI and JAINTIA HILLS, rare, NAGA HILLS, Piphima, 3,000 ft.—Clarke.

Flrs. Rainy season. Fr. Cold season.

3. *Polygonum glabrum* Willd.

A stout erect herb with woody rootstock. *Leaves* mostly 3-6 in. long, lanceolate or linear-acuminate, tapering at the base, glabrous, secondary nerves many; petiole short;

stipules not ciliate, tubular, 1-1.3 in. long. *Flowers* pink or white in slender usually glabrous, spiciform, paniced racemes, 1.5-3 in. long; bracts tubular, truncate or oblique, rounded; pedicels slender, 5-6 together in the axils of bracts. *Stamens* 6-8. *Styles* usually 2; nut biconvex, rarely trigonous.

Edges of nalas, and ditches "from ASSAM, SYLHET and BENGAL to the INDUS." There are no specimens at Calcutta from our area.

Flrs. 4-5. Fr. 10-1.

4. *Polygonum paleaceum* Wall. Vern. *Lang-wa-rai*, Khasi.

A scapigerous perennial with stout rootstock about .6 in. across. *Cauline* leaves 2.5-9 in. long, linear-oblong or lanceolate or oblanceolate, acute or obtuse, crenulate, glabrous or thinly hirsute beneath, nervules prominent, close and furcate near the margins; base attenuate to the long slender petiole, which is 1-3 in. long; stipules tubular, ciliate, up to 1.5 in. long. *Flowers* pink, about .12 in. long, crowded in cylindric spiciform racemes, about .4 in. across and .6-2 in. long, solitary at the end of leafy scapes, 6-16 in. high; bracts ovate-lanceolate, mucronate or shortly awned; pedicels capillary, elongating with age upto .15 in. long; perianth-segments 5; stamens usually 8; styles 3; nut trigonous.

KHASI HILLS, 4-6,000 ft., common in open grass lands.

Flrs. most of the year mainly 3-11.

5. *Polygonum chinense* Linn. Vern. *Kel-nap*, Kuki.

A shrub with herbaceous shoots and woody base, often scrambling among bushes or in var. *khasyanum* a climber with woody stems reaching tops of trees; branches with glandular hairs, hispidulous, specially at the nodes, or glabrate, striate. *Leaves* very variable, 1-6 by .6-3.5 in., oblong-lanceolate to ovate-oblong, deltoid-ovate or elliptic, acute or acuminate; base truncate, rounded or sub-cordate, but often abruptly cuneate and decurrent on the petiole of the upper leaves, sometimes amplexicaul, margins entire or sometimes glabrous, minutely crenulate or serrulate, more or

less hairy or hispidulous on the nerves beneath; lateral nerves ordinarily 6-10 on either side, sometimes more, with many intermediates, prominent beneath; petiole $\cdot 25\text{--}\cdot 5$ in., pubescent, hispidulous or glabrate, usually unequally auricled at the base, auricles rounded, deciduous, upto $\cdot 7$ in. across, one or both sometimes suppressed; stipules with an obliquely truncate tube and a long and pointed apical portion. *Inflorescence* of peduncled heads arranged corymbosely or in panicles; peduncles hispidulous or glandular, specially near the flower heads or sometimes glabrate upto $\cdot 6$ in. long; bracts of the flower clusters scarious, not ciliate, glabrous or hispidulous; heads $\cdot 2\text{--}\cdot 3$ in. across. *Perianth* segments 5, white or pink, sub-equal, yellowish glands on either side of the filaments. *Style* 3-fid. *Nutlets* trigonous; fruiting perianth fleshy or dry.

Throughout the area.

The plant is very variable. The following varieties, which roughly indicate the degree of variation in our area may be mentioned. These are not constant as intermediate forms occur. *P. chinense* proper. *Stems* weak. *Leaves* usually 1-3 in. long, sometimes larger, broadly lanceolate, or deltoid-oblong; base often truncate or subcordate with a wedge on the petiole, glabrous or nearly so. *Peduncles* stout, glabrous or glandular.

NOWGONG—*Simons*; SYLHET and CACHAR, *Keenan*, *Wallich* 1707A, NAGA HILLS, *Prain*; MISHMI HILLS, *Griffith*; KHASI HILLS, Barapani.

Flrs. 9-12.

Var. ovalifolia Meissn. *Leaves* 3-6 $\cdot 5$ in. long, broadly oval or elliptic, glabrous or pubescent on the nerves beneath; peduncles conspicuously glandular not slender—KHASI HILLS.

Var. scabra Meissn. *Leaves* roughly hairy on both surfaces, hairs on the branches deflexed; peduncles glandular, often pinkish, not slender—KHASI HILLS—Shillong.

Var. corymbosa. Erect shrub; leaves oblong-lanceolate; heads large—KHASI HILLS, NAGA HILLS.

Var. subhastata Meissn. *Leaves* sometimes very long, oblong or lanceolate; base subhastate or cordate, hispidulous on the nerves beneath, heads small.

KAMRUP, KHASI HILLS, Dibrugarh.

Var. brachiata. *Leaves* 3-6 in. long, oblong-lanceolate to ovate-oblong, acuminate, glabrous or hispidulous on the nerves beneath.

Panicles glandular and hispidulous, lax; ramifications brachiate, slender; heads small, few-flowered.

KHASI HILLS, SIBSAGAR. GARO HILLS—Mann., SYLHET, CACHAR, LAKHIMPUR—Clarke.

Var. *khasyana* ? Stem stout, woody, about .7 in. across reaching tops of tall trees. *Leaves* 3.5-7 by 1.6-2.2 in., oblong-ovate or lanceolate, acuminate; base subcordate or subtruncate, margins usually minutely crenulate, coriaceous, glabrous above, hispidulous along the midrib and sometimes along the lower lateral nerves; midrib often red above; stipules larger than in other forms 1.5-2 in. long. *Panicles* lax; peduncles slender, glandular and hispidulous; heads few flowered, small.

KHASI HILLS—cool situations.

Flrs. 7-12.

6. *Polygonum capitatum* Ham.

A perennial creeping herb or undershrub with woody rootstock; stems adventitiously rooting, often reddish brown, shoots hairy; hairs brown. *Leaves* .5-1.5 by .3-1 in., ovate to ovate-elliptic, acute or subacute, entire, thinly hairy on both surfaces or glabrescent above, margins ciliate; petiole 0 or very short, unequally auricled at the base; stipules tubular, hairy. *Flowers* small, pink or purplish, in dense peduncled capitate heads, .25-.5 in. across; peduncle 1-3 together, .5-1.2 in. long, glandular at least near the top; bracts ovate-lanceolate, acute. *Perianth* 5-partite; stamens 8. *Nut* trigonous, black.

KHASI AND JAINTIA HILLS, 3-6,000 ft.; NAGA HILLS; MANIPUR; trailing on rocks and banks.

Flrs. & Fr. almost all the year round.

7. *Polygonum microcephalum* Don.

A glabrous or sparsely hairy herb attaining 3 ft. with a woody, perennial root stock. *Leaves* 3-5 in. long, hastately ovate-lanceolate or oblong-acuminate, abruptly narrowed to the winged petiole, which is sometimes auricled at the base. *Flowers* in small heads .25-.3 in. across in axillary or sub-terminal, glabrous, slender peduncles. *Perianth* 5-cleft; stamens 8. *Styles* 2-3, connate below. *Nut* 3-gonous.

KHASI HILLS, upto 5,000 ft.; NAGA HILLS, *Prain*; N. C. HILLS (Haflong), *Craib*. SIBSAGAR, *Masters*; SYLHET, *Wallich*; ASSAM, *Fischer*.

Flrs. 6. Fr. 8-9.

8. *Polygonum paniculatum* Bl.

A spreading scrambling shrub attaining about 8 ft., all parts glabrous, stems woody below; branches flexuous, terete. *Leaves* 5-7 by 2-3 in., elliptic-ovate or caudate-acuminate, entire, margins often ciliate; lateral nerves 12-24 on either half with smaller ones between; base subcordate, rounded or narrowed; petiole .4-1 in. long; stipules with a long limb, lanceolate. *Flowers* about .1 in. across, white in lax terminal and axillary often leafy panicles; pedicels slender, short; bracts minute, obtuse. *Perianth* 5-partite; segments oblong; nut small, trigonous, black, enclosed within the fleshy perianth, which attains about .15 in. in fruit.

NAGA HILLS—Kohima—*Prain*.

Flrs. & Fr. 8-10.

9. *Polygonum rude* Meissn. Vern. *Ja-long-noh*, Khasi.

A tall bushy herb or shrub with herbaceous branches attaining 8 ft. in favourable situations; branches stout, strigose like the petioles with deflexed hairs. *Leaves* 3-6.5 by 1-2.5 in., elliptic-lanceolate or lanceolate-acuminate, margins entire, ciliate, pubescent on the midrib and glabrate or thinly pubescent elsewhere above, pubescent specially along the nerves beneath, with spreading hairs; lateral nerves 15-30 on either half, fewer on imperfect leaves, arcuate; base acute or narrowed; petioles up to .7 in. long; stipules usually strigose with long adpressed hairs; basal portion persistent, upper deciduous, up to 1.7 in. long. *Flowers* small, about .15 in. across, white, somewhat lax, sometimes leafy, in terminal or axillary panicles, laxly hirsute with long flexuous hairs; pedicels about .1 in. long, occasionally few longer than others, slender. *Bracts* whitish about .15 in. broad, rounded. *Perianth* 5-cleft; segments elliptic-oblong. *Stamens* 8, alternating with 8 round perigynous glands.

Styles 3. *Nutlet* about .17 in. long, trigonous, slightly exceeding the perianth, which becomes sometimes fleshy.

Common above 4,000 ft. in KHASI HILLS.

Flrs. & Fr. 7-12, also at other times of the year.

10. *Polygonum molle* Don. Vern. *Ja-ryndem*, Synt.

A subscandent or straggling bushy shrub often with zigzag stems; branches clothed with erect (never deflexed) adpressed hairs. *Leaves* 3-6 by 1-2·2 in., lanceolate to elliptic-lanceolate, acuminate, margins ciliate; lateral nerves 10-25 on either half, pubescent on the midrib and glabrate or thinly pubescent elsewhere above, undersurface silkily villous when young, less densely silky with age; petiole silky-villous, about .7 in. long; stipules clothed with long, spreading silky hairs, deciduous with the exception of a small basal portion. *Flowers* white, about .15 in. across in terminal and axillary somewhat lax panicles, hirsute with long flexuous hairs; bracts small, hairy, rounded; pedicels upto .1 in. long. *Perianth* as in the last species. *Nutlets* 3-gonous, included in the usually fleshy perianth.

KHASI HILLS—4,6,000 ft.

Closely resembling the last species, but is more softly and silkily hairy on the undersurface of the leaves, the hairs on the stems are never deflexed; the nut is included.

Flrs. 5-8. Fr. 10-11.

11. *Polygonum perfoliatum* Linn. Vern. *Ma-sein-thli*, Khasi.

A prickly climber or rambling shrub; stems herbaceous except towards the base; branches and petioles armed with sharp recurved, prickles. *Leaves* 1-3 in. across, peltate, deltoid, with obtuse or subacute angles, membranous, glabrous and pale green above, glaucous green beneath, midrib and nerves beneath sometimes prickly, basal nerves 3-5; petiole slender, a little longer than or as long as the blade; stipules foliaceous, .5-1·5 in. across, orbicular, amplexicaul. *Flowers* white, about .12 in. long, in short terminal and axillary simple racemes attaining about 1·2 in.; peduncles sometimes with

few prickles; bracts membranous, broad, rounded, glabrous. *Perianth* segments 5, broadly elliptic, rounded. *Stamens* 8; styles connate below. *Nut* globose, obscurely 3-gonous, black, about .2 in. long, enclosed in the often fleshy perianth.

The basal portion of the plant is perennial, upper portion die back every year.

KHASI HILLS upto 5,000 ft. SIBSAGAR, SYLHET—*Wallich*, probably in other districts as well.

Flrs. & Fr. 7-10.

P. arifolium *Linn.*

Herbaceous; stem slender, flaccid. *Leaves* 2.2-5 by .9-1 in., hastate-acuminate, membranous, almost glabrous, sparsely setose along the nerves beneath; base truncate; petiole about 1 in. long; stipules ridged, ciliolate. *Heads* small, few flowered. *Perianth* 5-cleft. *Stamens* 5. *Nut* trigonous, ovoid.

KHASI HILLS. (6,000 ft.)

Flrs. 8.

P. prætermisum *Hk. f.*

A small glabrous herb. *Leaves* 1-2 by .3-.4 in., linear-oblong, bluntly acuminate, sagittate, glabrous; petiole about .5 in. long. *Stamens* 5. *Nut* punctulate.

KHASI HILLS (5,000 ft.) SYLHET (*Wallich*).

Flrs. 5.

P. campanulatum *Hk. f.* Var. *fulvida*.

A stoloniferous rather pubescent perennial. *Leaves* 2-5 by 1.2-3 in., elliptic or lanceolate, acuminate, pubescent, membranous (clothed with fulvous tomentose beneath?); lateral nerves fine, about 20 on either half; base rounded, slightly oblique; petiole about .2-.4 in. long. *Flowers* in terminal cymes. *Perianth* campanulate. *Stamens* 8. *Nut* pale.

NAGA HILLS (10,000 ft.)

Flrs. & Fr. Autumn season.

The following species are also recorded from the region of this flora :—*P. alatum* *Buch-Ham.*, *P. assamicum* *Gandoger*, *P. barbatum* *Linn.*, *P. flaccidum* *Meissn.*, *P. Hydropiper* *Linn.*, *P. lanigerum* *Br.*, *P. lapathifolium* *Linn.*, *P. macranthum* *Meissn.*, *P. Meeboldii* *W. W. Smith.*, *P. minus* *Huds.*, *P. muricatum* *Meissn.*, *P. orientale* *Linn.*, *P. palmatum* *Dunn.*, *P. pedunculare* *Wall.*, *P. Posumbu* *Ham-Buch.*, *P. runcinatum* *Linn.*, and *P. sagittatum* *Linn.*

2. FAGOPYRUM Gærtn.

Fagopyrum cymosum Meissn. Vern. *Ja-rain*, Khasi.

A tall, branching herb with a perennial base. *Inflorescence* petiole and leaves along the nerves thinly pubescent or puberulous. *Leaves* 2-4 in. long, upper smaller, deltoid, or triangular, shortly acuminate, often with short acute or obtuse basal lobes, sagittate or cordate at the base, secondary nerves digitately spreading from the base and incurved upwards; petioles slender, up to 5 in. long. *Flowers* small, white, recurved on the branches of terminal and axillary paniculate cymes. *Perianth* 5-partite; segments about .15 in.; stamens 8; ovary 3-gonous; styles 3; nut extruded.

KHASI HILLS, 4-5,000 ft. A common weed.
The leaves are eaten cooked as vegetable.

Flrs. 7-11.

F. esculentum Mæench. The buckwheat. Vern. *Jarain*, Kh.; *Phapar*, Nep.

A glabrous annual attaining 3 ft. *Leaves* 1-4 in. long, triangular-cordate. *Flowers* white or pink in dense subcapitate cymes.

Cultivated in KHASI HILLS.

The nuts are ground into flour and made into bread. The pink flowers are said to be sterile.

3. RUMEX Linn.

Rumex nepalensis Spreng.

A robust herb with stout perennial rootstock. *Leaves* 5-7.5 by 2-3.5 in., upper smaller, oblong or elliptic-ovate, cordate, lower ones long stalked, upper nearly sessile. *Flowers* 2-sexual, small, green in whorls arranged on long racemes. *Perianth* 6-partite; margins fringed with usually hooked setæ, all persistent, the inner 3 enlarged and coriaceous in fruit, 1-2 of which develop an oblong tubercle on the midrib; stamens 6; ovary trigonous; styles 3 with fringed stigmas. *Nut* brown.

Common near water and in waste lands usually in fresh soils.

Flrs. 5-10.

R. vesicarius Linn. Vern. *Chuk-palang*, Beng., Ass.; *Chooka*, Hind., Bladder dock.

A rather fleshy pale-green annual. *Leaves* 1-3 in. long, elliptic-ovate or oblong, cordate, hastate or cuneate and 3-5 nerved at the base; petiole long. *Flowers* monœcious; inner perianth segments membranous, reticulate, often pink, without teeth or tubercle.

Cultivated throughout the area as a vegetable. It is pleasantly acid when cooked and is also used medicinally.

Rheum Rhaponticum Linn. The rhubarb is cultivated in the KHASI HILLS as a vegetable; the petiole of the leaves is eaten.

Antigonon leptopus Hook & Arn. Sandwich Island creeper or coral creeper.

A large handsome evergreen climbing shrub; branchlets and rachis of inflorescence often passing into tendrils. *Leaves* alternate, the lower 7 by 4 in., upper smaller, ovate-acute; nerves impressed above; base cordate with rounded basal lobes, somewhat rugose; petiole up to 1.5 in. long; stipules consisting of a raised line round the stem. *Flowers* about .5 in. across, white or pink, in panicles. *Perianth* segments 5, 2 inner smaller; stamens 8, connate towards the base into a ring, with short teeth between the filaments. *Ovary* 3-gonous, with 3 free styles.

A native of TROPICAL AMERICA. Cultivated in gardens in the plains as an ornamental plant for covering trellises, arches, etc.

Flrs. Rainy and Cold season.

Muehlenbeckia platyclada Meissn.

A glabrous shrub with all the branchlets converted into flattened phylloclades, appearing as if jointed, bearing in the rains alternate fleshy rhomboid leaves about 1 in. long, which soon fall off. *Flowers* small, green and white in sessile clusters at the nodes. *Perianth* segments 5. *Stamens* 8-9; *ovary* 3-gonous; stigmas 3, fimbriate.

Often cultivated in gardens as an ornamental plant in the plains. A native of Solomon Islands.

FAM. 108. *PODOSTEMONACEÆ*.

Acquatic herbs (submerged) growing on stones in fresh water, usually annual. *Leaves* simple, delicate, distichous, usually sheathing. *Flowers* 2-sexual, regular and 3-merous with a perianth or zygomorphic and bimerous without one. *Stamens* hypogynous; filaments few or partially connate; anthers 2-celled. *Ovary* 2-3-celled; ovules numerous, anatropous; stigma 2-3. *Capsule* usually stipitate, septicidal or septifragal. *Seeds* numerous, minute; testa mucilaginous; albumen 0, embryo straight; radicle inferior.

Hydrobryum Griffithii Tul.

A small green herbaceous frondose plant, growing on stones. *Flowers* bisexual, enclosed in a spathe. *Perianth* 0. *Stamens* 2; stigma 2, subsessile. *Capsules* stipitate, valves 5-ribbed.

KHASI HILLS, (3,000 ft.). (No specimen in Forest Herbarium, Shillong). (F.B.I., P. 63, Vol. V).

H. lichenoides Kurz. also occurs in the region of this flora (D. Chatterjee).

PODOSTEMON Michaux

Podostemon Wallichii Br. Small herb about 1 in. long. *Stem* frond-like, 2-sexual, zygomorphic, sessile in a spathe. *Stamens* 2, staminode 2 or a third arising from the fork of the filament. *Ovary* ellipsoid, 2-celled. *Fruit* ribbed, narrowed into the stalk, valves persistent, incurved.

KHASI HILLS (Wallich, Griffith). (No specimen in Forest Herbarium, Shillong). (F.B.I., P. 67, Vol. V).

P. pterophyllus Benth and **P. minor Benth** are also recorded from the region of the flora.

The generic name is now known as *Dicraea* (Tul).

FAM. 109. *NEPENTHACEÆ*.

Carnivorous plants (shrubs or undershrubs) prostrate, erect or scandent, evergreen. *Leaves* alternate, exstipulate, consisting of a basal lamina, with excurrent tendril-like midrib which bears a pitcher of various forms, pitcher with 2 longitudinal ribs or wings in front at first closed by a lid which later on arches over the orifice of the pitcher, inner surface of pitcher glandular below the middle and adapted for trapping insects, mouth with revolute, closely ribbed margin (peristome). *Inflorescence* a terminal or lateral raceme or cyme, rarely paniced. *Flowers* diœcious, regular,

small, green or brownish. *Perianth* 4, rarely 3-partite; segments in decussate pairs, glandular and nectariferous within. MALE FLOWERS:—*Stamens* monadelphous; anthers 4-24, usually 8-12, collected into a globose mass, extrorse. FEMALE FLOWERS:—*Ovary* superior, 3-4 celled, usually hairy; ovules numerous; style short or 0; stigma discoid, 3-4 lobed. *Fruit* a coriaceous loculicidal capsule. *Seeds* very numerous, minute, albuminous; testa membranous, produced into a filiform wing at either end; embryo straight.

NEPENTHES Linn.

Nepenthes khasiana *Hk.f.* Vern. *Tiew-rakot* (Demon flower), Khasi.

An undershrub with short stout prostrate stem. *Lamina* of leaf 9-24 by 1·15-3·5 in., sessile, lanceolate, acute or acuminate; base narrowed and attenuate, amplexicaul; lateral nerves many, ascending, close, subparallel; pitchers on long tendrillar stocks 5-8 by 1·5-3 in., sub-cylindric, green reddish above, inflated above the base, mouth somewhat contracted, glabrous, membranous, young shortly winged; lid membranous, closely glandular dotted. *Racemes* peduncled, robust, puberulous to tomentose, up to 26 in. long including the 9 to 10 in. long peduncle; cymes pubescent, usually 2-flowered; pedicels ·25-·35 in. long, slender. *Flowers* greenish-red, ·3-·4 in. across, perianth-segments 4, elliptic or elliptic-oblong, pubescent outside, glabrous within. *Staminal* column red. *Ovary* pubescent. *Capsule* elongate, ovoid-oblong, ·75-1 by ·25-3 in., seated in the persistent perianth.

GARO HILLS, Tura forests, KHASI & JAINTIA HILLS, Nonghulen 4,000 ft. Jarain, Longrien.

Found in abundance in the southern parts of Garo Hills—R. N. De.

The pitcher is rubbed into a paste, insect and all, and given to cholera patients mixed with water.

Flrs. 6. Fr. 9-10.

FAM. 110. CYTINACEÆ (*Rafflesiaceæ*).

Fleshy parasites on the roots, stems and branches of various plants. *Leaflets* or leaves scale-like. *Flowers* often large, solitary, rarely spicate, didymous by abortion, rarely polygamous or 0; perianth more or less epigynous, segments 4-10, imbricate or rarely valvate. *Stamens* innumerable; anthers sessile, arranged in 1-3 series on a fleshy central column, 2-celled, brushing by slits or pores. *Ovary* inferior or semi-inferior or 1-celled or the placenta reaching nearly into the middle; stigmas various; ovules very numerous. *Fruit* fleshy. *Seeds* minute, very numerous; endosperm cellular; embryo minute.

Sapria himalayana Griff.

Dicæious. *Buds* globose; bracts white and pink. *Flowers* fœtid, usually 5-6 in. across; (upto 1'-2'' in. across, N. L. Bor) tube blood red within; segments fleshy, warted; anthers about 20. *Ovary* traversed by longitudinal sinuous cells; stigma a papillose cone in the centre of the disc. *Fruit* swollen, crowned with the perianth,

KHASI HILLS, N.-E. F. TRACT, (L. H. Burkill's No. 37,556).
BALIPARA FRONTIER TRACT (N. L. Bor). (F.B.I.P. 71).

Flrs. 12.

FAM. 111. ARISTOLOCHIACEÆ.

Climbing herbs or shrubs, rarely erect. *Leaves* alternate, exstipulate, simple, entire or lobed, base of petiole often dilated, sometimes decurrent. *Flowers* 2-sexual, zygomorphic or rarely regular, solitary, racemose or in cymes, bracteate or not. *Perianth* superior, petaloid, gamophyllous, variously shaped; lobes valvate. *Stamens* 6 or more in 1 or 2 series around the base of the style with which they are combined into a column or free; anthers 2-celled, extrorse.

Ovary 4-6 celled, placentas parietal, meeting on the axis or free; style thick, short, divided into 3 or more stigmatic lobes at the top; ovules numerous in each cell. *Fruit* capsular, rarely indehiscent, usually dehiscing from base upwards; seeds numerous, 3-sided or flattened; endosperm copious, fleshy; embryo small.

ARISTOLOCHIA Linn.

Shrubs or perennial herbs, usually climbing. *Leaves* entire or lobed, often with a stipule-like leaf of an undeveloped bud in the axil, otherwise exstipulate. *Flowers* solitary, fascicled or racemose in the leaf axils; bracts at the base of flowers often large. *Perianth* very variable in shape, size and colour; the tube usually inflated below, then contracted in a cylindrical neck, and again expanded into 2-lipped oblique limb, tube usually villous within. *Stamens* usually 6, adnate to and round the style column with which the filaments and connectives are fused. *Ovary* inferior, usually more or less 6-celled; style column thick, divided above the anthers into 3-6 lobed stigmatiferous disk. *Capsule* thin walled, septically 6-valved or splitting through the placentas, the dehiscence frequently continued into the pedicels. *Seeds* many, horizontal, often with the remains of the placenta attached more or less flattened; albumen fleshy.

Leaves glabrous, seeds winged. 1. *A. Tagala*.

Leaves hairy beneath, seeds not winged :—

Perianth sharply bent back upon itself, lower half an inflated sac, upper trumpet or cup shaped :—

Leaves lobed, breadth equal to length or broader. 2. *A. platanifolia*.

Leaves not lobed, longer than broad :—

Leaves broadly ovate, usually densely silky beneath with spreading shaggy hairs, tube of perianth above the sac short and dilated. 3. *A. Cathcartii*.

Leaves narrow, (linear-oblong or lanceolate) undersurface of leaves not shaggy, usually thinly hairy except on the nerves; tube of perianth above the sac slender. 4. *A. saccata*.

1. *Aristolochia Tagala* Cham. Syn. *Aristolochia Roxburghiana* Klotz. Vern. *Chohu*, Mik.; *Panpipuli*, *Belikol*, Ass.

A glabrous dextrorse twiner, roots stout, somewhat aromatic. *Leaves* 4-8 by 1·5-3·7 in., upper smaller, ovate or ovate-oblong, upper lanceolate, acuminate or acute, entire or slightly undulate; base cordate to subsagittate in upper leaves, usually more or less lobed around the sinus, pedately 5, sometimes 7-nerved, uppermost pair ascending; lateral nerves—excluding the basal 2-3 on either half; petiole ·6-2 in. long, often more or less coiled. *Flowers* dark brown in racemose puberulous, lax flowered cymes 1-3 in. long; peduncles and pedicels slender. *Perianth* 2·5-3·25 in. long, base inflated, tube 1-1·25 in. long, slender, curved, mouth about ·3 in. across, oblique, with recurved margins, lip 1·5-2 in. long, villous. *Capsule* variable in size, 1-2·5 in. long, oblong or globosely pyriform, 6-ribbed. *Seeds* obtusely triangular, very variable, from ·15 in. across and narrowly winged in small capsules to ·5 in. across and broadly winged in larger capsules, one face minutely tubercled or tubercles sometimes few or absent in larger seeds.

SIBSAGAR, NOWGONG, KAMRUP, N. CACHAR HILLS, LUSHAI HILLS, KHASI HILLS, up to 4,200 ft., GOALPARA; probably throughout the province.

The roots are used medicinally.

Flrs. 4-6. Fr. 11-1.

2. *Aristolochia platanifolia* Duchart. Vern. *Durgup-bipha*, Garo.

A stout climber. *Leaves* about 12 in. long and about as broad or broader, deeply digitately 3-lobed, cleft to near the base, lobes pinnatifidly lobulate, very variable, lobules few, acute or acuminate; base rounded-cuneate or cordate, glabrous and shining above, glaucous pubescent or tomentose beneath; petioles 2-3 in. long, stout, often twining. *Flowers* axillary and solitary or in villous cymes on the old wood; cymes shortly peduncled; pedicels 1-1·5 in. long. *Perianth* yellowish with purple veins externally, clothed with spreading or villous sac 1·5 in. long, tube as long, golden

yellow within, mouth 1 in. across, obtusely 6-angled, lip recurved, purple, papillose. *Capsule* 4-6 by 1-1.5 in., linear-oblong, 6-ribbed with deep furrows between.

A fragmentary specimen in Forest Herbarium, Shillong, from Dambu reserve, GARO HILLS (No. 5383) has been referred to this species.

KHASI HILLS, *Hooker and Thompson*.

The above description has been largely compiled from F.B.I.

Flrs. 10.

3. *Aristolochia Cathcartii* Hk. f. & T.

A large climber, with corky furrowed bark; young branchlets and petioles villous. *Leaves* 5.5-10 by 3.5-6.5 in., broadly ovate, sometimes ovate-lanceolate, acute or acuminate, entire; base cordate, sometimes slightly lobed along the sinus, 3-nerved or pedately 5-nerved, thinly coriaceous, pubescent or puberulous along the midrib and larger nerves specially towards the base, otherwise glabrous above, clothed, often felted with long adpressed silky hairs beneath; lateral nerves excluding the basal 5-6 on either side; petioles 1.5-4 in. long, sometimes twining. *Flowers* usually in short brown villous cymes from axils of existing or fallen leaves; pedicels .6-1 in. long, villous. *Perianth* yellowish white, with purple veins clothed with spreading hairs outside, 2.5-3 in. long along the bends, sac bent near the short neck, mouth square, densely purple papillose along the edge and the recurved lip. *Capsule* about 6.5 by 1.7 in., linear-oblong, bluntly apiculate, softly tomentose, 6-ribbed, grooved between the furrows; seeds about .4 in. long, not winged, obovate, acute at the base, margins slightly incurved on the inner face, dorsally more or less truncate and margined.

KHASI HILLS, up to 3,000 ft. SIBSAGAR, DARRANG and probably in other districts *e. g.*, GARO HILLS.

Flrs. 4-6.

4. *Aristolochia saccata* Wall.

A stout dextrorse climber. *Bark* corky, furrowed; branchlets villous with deflexed hairs. *Leaves* very variable, 5-8 by 1.4-2.5 in., but sometimes attaining 12 in. in length, narrow-oblong, oblong-lanceolate, acuminate; base subcordate or cordate, usually 5-nerved, pubescent or puberulous along

the midrib, otherwise glabrous above, undersurface paler and pubescent along the principal nerves, more thinly elsewhere, coriaceous; lateral nerves excluding the basal 4-5 on either side; petiole 1-2 in. long. *Flowers* about 2 in. long along the bends in villous cymes, yellowish white with purple veins, clothed with spreading hairs outside, sac curved below the neck, basal portion obscurely ridged, and marked off by a slight constriction, neck constricted about .3 in. long, mouth nearly circular and like the lip with a narrowly reflexed purple papillose border. *Capsule* as in *A. Cathcartii*.

KHASI & JAINTIA HILLS, *e.g.*, Serarim—4-6,000 ft., 1-4,000 ft. Hooker and Thompson, SYLHET—Bruce.

There are specimens in Sibpur collected from Upper Dehing Reserve, LAKHIMPUR and Dikho Forests, ASSAM of the broad-leaved form, the leaves of which attain 12 by 7 in. (ovate-cordate).

Several species of *Aristolochia*, mostly Brazilian in origin are cultivated in gardens for flowers.

Flrs. 8-3. Fr. 5.

Apama tomentosa (Bl.) Chatterjee Comb. Nov. Mss. Syn. *Bragantia tomentosa* Bl.

A herbaceous undershrub; stem creeping below and rooting, angular. *Leaves* 4-6 by 2.5-4 in.; base 6-9 nerved. *Flowers* .5-.8 in. across; bracts persistent. *Perianth* lobes acute, cordate. *Stamens* 1-seriate. *Ovary* linear. *Capsule* 2 in. long; seeds trigonous, rugose.

SYLHET. (F.B.I. V. 73).

It is extremely bitter and used by the Javanese as an emmenagogue (I.M.P.).

Flrs. 7.

FAM. 112. PIPERACEÆ.

Herbs or shrubs, usually aromatic with branches often swollen at the nodes. *Leaves* entire, alternate, rarely opposite or whorled, often gland dotted; stipules 0 or adnate to the petiole. *Flowers* minute, 1-2 sexual, in axillary catkin-like spikes or spikes umbellate, subtended by a peltate bract.

Perianth 0. *Stamens* 2-6 (rarely 1 or 7-8) hypogynous; anthers 2-celled, often jointed on the filaments, dehiscing longitudinally or confluent. *Ovary* of 3-4 carpels free or connate below, each many ovuled or ovary 1-celled with a solitary ovule; stigma sessile, simple or penicillate. *Fruits* indehiscent or baccate when ovary is syncarpous; of cocci or follicular when ovary is apocarpous. *Seeds* ovoid, oblong or globose; albumen mealy; embryo very small, enclosed in a sac of endosperm, radicle superior.

Ovary of 3-4, practically connate, carpels, 1-celled.

1. **Houttuynia.**

Ovary syncarpous, 1-celled :—

Anther-cells distinct; stigma 3-5, more or less connate or confluent :—

Fruit baccate. 2. **Piper.**

Anther-cells confluent; stigma usually penicillate :—

Fruit minute, indihescent. 3. **Peperomia.**

1. HOUTTUYNIA Thunb.

Houttuynia cordata Thunb.

A perennial with creeping root-stock; stem herbaceous, angular. *Leaves* 1·5-3·5 by 1·2·5 in., broadly ovate-acuminate, membranous, 5-7-nerved, approximate near the base, gland-dotted, pubescent on the nerves specially when young; base deeply cordate, sheathing, narrowed into the petiole ·5-1·5 in. long; stipules linear-lanceolate. *Flowers* minute in dense-flowered spikes, subtended by an involucre of 4-6 white, partially connate bracts; perianth 0. *Stamens* 3. combined with ovary up to one-third its height; stigmas recurved. *Fruit* sub-globose. *Seeds* globose; testa membranous.

NAGA HILLS, KHASI HILLS, (upto 6,000 ft.), MANIPUR, SYLHET, PLAINS OF ASSAM.

Eaten as vegetable raw and cooked, much relished.

Flrs. 4-6. Fr. 7-8.

2. PIPER Linn.

Shrubs or perennial herbs, often climbing by adventitious roots from the nodes, usually aromatic, often glandular, nodes dilated. *Leaves* entire, stipulate, often unequal-sided;

basal nerves 3 or more, supra-basal nerves 1 pair, opposite or alternate. *Flowers* small, dioecious or polygamous, rarely 2-sexual in the axil of a peltate bract; spikes usually oppositifolius. *Bracts* orbicular or oblong. *Perianth* 0. *Stamens* 2-4; filaments short, anther 2-celled. *Ovary* 1-celled; stigma 2-6; ovule solitary. *Fruit* baccate, globose or ovoid, 1-seeded. *Seeds* usually globose; testa thin.

- I. Spikes solitary. Flowers crowded; female bracts peltate :—
 Fruit pedicelled :—
 Climbing shrub, quite glabrous. .. 1. *P. Griffithii*.
- II. Spikes solitary. Bracts orbicular, peltate :—
 Fruit small, crowded, sessile in dense cylindric or oblong spikes :—
 Fruiting spikes longer than broad :—
 Leaves glabrous :—
 Fruiting spikes .75-1.2 in. long :—
 Leaves ovate-cordate :—
 Petiole 1-3 in. long. .. 2. *P. longum*.
 Fruiting spike about .5-.75 in. long :—
 Leaves linear-oblong or ovate-oblong, 3-5-nerved (base) .. 3. *P. peepuloides*.
 Fruiting spike 1-1.5 in. long :—
 Leaves rounded, ovate, 7-nerved (base). .. 4. *P. petiolatum*.
 Fruiting spike 1.5 in. long, pendulous :—
 Leaves coriaceous, oblique, ovate-oblong or ovate-cordate :—
 Petiole .5-1.5 in. long. .. 5. *P. Betle*.
 Fruiting spike 3-6 in. long :—
 Leaves membranous oblong or linear-oblong :—
 Petiole not exceeding .25 in. .. 6. *P. bæhmeriæ-folium*.
 Leaves pubescent :—
 Fruiting spikes 1.5-3 in. long :—
 Leaves elliptic or orbicular-ovate :—
 Climbing. .. 7. *P. aurantiacum*.
 Fruiting spike globose; stigma sessile :—
 Quite glabrous :—

Fruiting spikes .25-.3 in.
long :—

Petiole .2-.5 in. long :—

Erect. 8. *P. brachystachyum.*

Fruiting spike .25 in. long :—

Petiole 1-2.5 in. long :—

Scandent. 9. *P. Thomsoni.*

III. Spikes solitary. Bracts peltate, orbicular.
Fruits forming along interrupted spikes,
pulpy, separate or sessile. Erect or
scandent :—

Quite glabrous :—

Leaves coriaceous; apex obtuse or
sub-acute :—

Fruiting spike 4-6 in. long. . . 10. *P. Hamiltonii.*

Peduncles and petioles
pubescent :—

Leaves membranous, apex
caudate-acuminate :—

Fruiting spike not exceed-
ing 1.5 in. long. . . 11. *P. khasianum.*

IV. Spikes solitary. Bracts adnate to rachis or
with free margin. Fruit separate, usually
in long solitary spikes :—

Bracts of female short, cupular, wholly
adnate, without raised margin :—

Leaves glabrous, 5-9-nerved. . . 12. *P. nigrum.*

Bracts decurrent with raised mar-
gins :—

Leaves glabrous or puberulous
beneath, 7-nerved. 13. *P. attenuatum.*

1. **Piper Griffithii** Cas DC. Vern. *Miti-horong-doukha*, Kach.; *Ai-rikang*, Mik.

Climbing by adventitious roots, glabrous. *Leaves* 1.5-3.5 by 1.2-2 in., ovate or ovate-acuminate, thinly coriaceous, glabrous, 5-nerved; supra-basal nerves opposite; base usually cordate; petiole .2-1 in. long, channelled; spikes solitary, simple. *Flowers* dioecious; fruiting spikes compact, dense. *Fruits* globose, small, constricted at the base into a stalk, black when ripe.

GOALPARA, N. C. HILLS and KHASI HILLS.

Flrs. Rainy season. Fr. Cold season.

2. *Piper longum* Linn. Vern. *Pipul, Piplu*, Ass.; *Ethipokang-arong*, Mik.

An aromatic herb, trailing on ground also climbing on trees, glabrous, root-stock jointed. *Leaves* 1-4 by .8-2.5 in., orbicular-ovate or ovate-oblong, acuminate, membranous, glabrous, 5-7-nerved; supra basal nerves opposite; base cordate; petiole .2-1.2 in. long. *Male spikes* slender, yellow. *Flowers* diœcious; bracts stalked, peltate. *Fruiting spike* .75-1.2 by .25-.3 in. long, fleshy. *Ovary* sunk, more or less confluent. *Fruit* .1 in. in diameter.

DARRANG, MIKIR HILLS, KHASI HILLS.

It contains a volatile oil, an acrid resin and piperine and it contains stimulant carminative properties. The root is described as bitter, stomachic and useful in promoting digestion. Its chief use is as a condiment (I.M.P.).

Flrs. Rainy season. Fr. Cold season.

3. *Piper peepuloides* Roxb.

A slender glabrous climber or an erect shrub about 10 ft. high. *Leaves* 2-4 by .5-1.5 in., elliptic-oblong, ovate-lanceolate, caudate-acuminate, membranous, glabrous, usually 5-nerved; supra-basal nerves usually being alternate; base obtuse and rounded; petiole .2-.5 in. long; spikes solitary. *Flowers* diœcious, male spikes slender; bracts peltate. *Fruiting spike* dense, cylindric, about 1 in. long; peduncle .3-.4 in. *Fruit* very small, .08 in. in diameter.

SIBSAGAR, N. E. F. TRACT, LUSHAI HILLS, DARRANG, KHASI HILLS.

The stem and roots are used as medicine in leprosy in the Khasi and Jaintia Hills (Jowai sub-division).

Flrs. Rainy season. Fr. Cold season.

4. *Piper petiolatum* Hook. f.

Quite glabrous. *Leaves* 6 by 3.5-5 in., orbicular, ovate-acuminate, thinly coriaceous, 7-nerved; base rounded. *Fruiting spike* cylindric, short. *Fruit* globose, .25 in across, yellow.

UPPER ASSAM, MISHMI HILLS (Griffith).

(F.B.I. p. 84 Vol. V. No specimen in Forest Herbarium, Shillong).

5. Piper Betle *Linn.* Vern. *Pan*, Beng.; *Tambul*, Ass.

Leaves ovate-cordate, elliptic-acuminate, 4-7 by 2-4 in.

Cultivated for its leaf throughout the province. Propagated by cuttings.

The leaves form the well-known masticatory with the addition of lime, catechu, areca nuts and other flavouring ingredients, also used in Hindu medicine as an ingredient (*Anupan*). It is aromatic, carminative, stimulant and astringent.

6. Piper boëhmeriæfolium *Wall.*

Tall, glabrous, scandent or creeping shrub. *Branches* ribbed, sub-terete. *Leaves* mostly inequilateral, very variable, 6-9 by 4-4.5 in. (local form), ovate, ovate-oblong, elliptic-lanceolate, acuminate, membranous, glabrous; base usually 5-(7)-nerved, oblique, occasionally auricled, rounded or narrowed into the petiole .2 in. long (sometimes up to .5 in. long). *Spikes* 4-6.5 in. long; peduncles 1-1.5 in. long. *Male* bracts stalked; anthers sessile, 2-celled. *Fruit* .12 in. in diameter.

KHASI HILLS.

Flrs. 12-2. Fr. Hot season.

Forma. glabrifolium *C.DC.* Much smaller leaves.

LUSHAI HILLS, NAGA HILLS, KAMRUP, KHASI HILLS, (upto 3,000 ft.).

7. Piper aurantiacum *Wall.*

A stout glabrous climber rooting at the node. *Leaves* 2.5-6 by 1.2-3 in., ovate, lanceolate or elliptic-ovate, caudate-acuminate, thinly coriaceous, 5-nerved, minutely gland dotted; supra-basal nerves opposite; base rounded or obtuse; petiole .5-1.3 in. long, slender; spikes elongated, sometimes up to 5 in. long. *Fruit* angular when young, globose on ripening.

LAKHIMPUR, KHASI HILLS.

Flrs. Rainy season. Fr. Cold season.

8. *Piper brachystachyum* Wall.

A much branched climber, woody branches thickened at the node and rooting. *Leaves* 2·5 by 1·2 in., elliptic-ovate or elliptic-lanceolate, bluntly caudate-acuminate, rather membranous, glabrescent, 5-nerved at the base; the pair of supra-basal nerves often very much higher up; base rounded or acute; petiole 2·5 in. long; male spike very slender, 2-3 in. long. *Fruiting spike* globose. *Fruits* small, about 1 in. in diameter.

KHASI & JAINTIA HILLS (upto 4,000 ft.).

Flrs. Rainy season. Fr. Autumn season.

9. *Piper Thomsoni* Hook. f.=*P. officinarum* DC.

Scandent, half woody; stem rooting at the nodes, glabrous. *Leaves* 3-5 by 1-2 in., ovate-oblong or elliptic-oblong, acuminate, membranous, 5-nerved, but often with 2 pairs supra-basal nerves; base truncate, shallow cordate or obtuse, often oblique; petiole 5-2 in. long; bracts peltate.

NAGA HILLS, LAKHIMPUR, MANIPUR, N.E. F. TRACT, GOALPARA, KHASI HILLS.

Flrs. Hot & Rainy season. Fr. Autumn & Cold season.

10. *Piper Hamiltonii* Cas. D.C.

A climbing shrub, often creeping on the ground, quite glabrous. *Leaves* 2-3 by 1-2·5 in., elliptic, sub-acute or obtuse, coriaceous, glabrous, 5-7-nerved from above the basal nerves; base cordate, often slightly oblique; petiole 5-2 in. long. *Flowers* diœcious; male spikes slender, up to 3 in. long; bracts orbicular, peltate. *Fruiting* spikes slender, loose, interrupted, glabrous, 4-6 in. long. *Fruits* rather globose.

PLAINS OF ASSAM, MANIPUR, SYLHET, KHASI HILLS, (upto 5,500 ft.).

Flrs. 10. Fr. 3.

11. *Piper khasianum* Cas. DC. Vern. *Mei-soh-maken-newrai*, *Mei-soh-mrit-khlow*, Kh.

A glabrous shrub, winding clock-wise; stem glabrous. *Leaves* 2·4 by ·7·1·5 in., ovate-lanceolate, oblong, caudate-acuminate, membranous, glabrous above, puberulous beneath, 5-nerved, 2-supra-basal nerves opposite; base rounded or obtuse; petiole ·1·3 in. long. *Flowers* diœcious. *Fruiting* spikes loose, interrupted, about 1·5 in. long; peduncle about ·6 in. long. *Fruits* globose, ·25 in. in diameter. *Seed* white, aril light brown.

KHASI and JAINTIA HILLS, (upto 5,500 ft.).

Fr. 4.

12. *Piper nigrum* Linn. Vern. *Gol-morich*, *Kalamorich*, Beng.

A stout glabrous shrub, climbing, often trailing on the ground and rooting at the nodes. *Leaves* 3-6 by 1·3 in., ovate-lanceolate or broadly ovate, elliptic-acuminate, membranous, dark-green shining above, glaucous beneath, 5-nerved, 2-supra-basal nerves usually alternate; base rounded or cuneate, often oblique; petiole ·2·5 in. long. *Spikes* very long, slender, pendulous; the female spikes often bearing bisexual flowers, but usually diœcious; bracts of female cupular, wholly adnate without raised margins; bracteoles in the female flowers forming a cup round the ovary; male spike slender, upto 6 in. long, pendulous. *Fruit* red, globose. *Fruiting* spike fleshy and interrupted.

PLAINS OF ASSAM, KHASI HILLS.

It is officinal.

Flrs. Rainy season. Fr. Cold season.

13. *Piper attenuatum* Ham.

A rambling, half climbing, half woody plant. *Branches* angled, grooved. *Leaves* 2·4·5 by ·7·3 in., orbicular-ovate or elliptic-lanceolate, abruptly acuminate, membranous, sparsely puberulous beneath, 5-7-nerved, often with 1 or 2-supra-basal nerves; base cordate or truncate or acute;

petiole 1-2 in. long. *Male* spikes slender; bracts adnate, cupular with raised margin. *Fruiting spikes* about 6 in. long or sometimes more. *Fruit* globose, .16 in. across.

LAKHIMPUR, SYLHET, KHASI HILLS, GOALPARA.

Flrs. Rainy season. Fr. Cold season

P. diffusum Vahl. Vern. *Soh-myrit*, Kh.

A stout climber, woody, rooting at the nodes, often trailing on rocks, glabrous. *Leaves* 2.5-5 by .8-2.6 in., elliptic-ovate or ovate-lanceolate, acuminate, sub-coriaceous, glabrous, 5-nerved, the pair of supra-basal nerves opposite or alternate; base rounded or cuneate; petiole .3-1 in. long. *Fruiting* spike globose, shortly peduncled, glabrous. *Fruit* black, globose, partially enclosed in cupular bracteole.

KHASI and JAINTIA HILLS, (upto 6,000 ft.).

Fr. Cold season.

P. sylvaticum Roxb. Vern. *Pahari-pipul*, Ass.

A low creeping herb. *Leaves* 3 ft. by 2-3 in., sparsely puberulous on the nerves beneath, ovate-cordate, membranous, acuminate.

All over ASSAM.

The fruit is used as a carminative like *P. longum*.

P. Mannii C. DC.

Leaves .8-3 by .3-1 in., elliptic-lanceolate, long acuminate, membranous, glabrous, 5-nerved; the 2 supra-basal nerves usually alternate; base rounded or acuminate, often oblique; petiole .05-.4 in. long.

KHASI AND JAINTIA HILLS.

Many other species of *Piper* are also recorded from the region of the flora.

Flrs. 7.

The following and numerous other species of *Piper* are also recorded from Assam :—

Piper anisotis Hk. f., **P. Clarkeii** C. DC., **P. Lonchites** R. & Sch., **P. Listeri** DC., **P. muneyporenses** DC., **P. nagaense** C. DC., **P. nepalense** Miq., **P. rhytidocarpum** Hk. f. and **P. Schmidtii** Hk. f.

3. PEPEROMIA Ruiz & Pav.

Peperomia reflexa A. Dietr.

A shrub, densely branched, herbaceous, procumbent on rocks near water or in shade or epiphytic; stipules 0.

Leaves in whorls of 4, .2-.4 by .1-.3 in., orbicular or obovate, obtuse, entire, coriaceous, pellucid-punctate; petiole .05-.1 in. long. *Flowers* bisexual,, minute; spikes exceeding the leaves. *Perianth* 0. *Stamens* 2, very short; anthers confluent; stigma usually penicillate. *Fruit* minute, indehiscent.

KHASI HILLS, N. E. F. TRACT (4,000-5,000 ft.).

Believed to be an excellent tonic and particularly efficacious in diseases of the kidney.

Flrs. and Fr. 9-11.

P. pellucida H. B. & K. A small herb of American origin is recorded from Sadiya (Royal Asiatic Society, Beng. IV, 1908, p. 632).

P. Heyneana Miq.

A small prostrate herb, quite glabrous. *Leaves* 3-nerved, pubescent beneath. *Spikes* solitary.

KHASI HILLS upto 6,000 ft., UPPER ASSAM.

FAM. 113. CHLORANTHACEÆ.

Herbs, shrubs or trees, usually aromatic. *Leaves* opposite, usually toothed; petioles often connate in a sheath, stipulate. *Flowers* 1-sexual in terminal or pseudo-axillary heads or panicles; female & male cohering in a bract. *Male* flowers :—perianth 0. *Stamens* 1-3-connate into a mass; filaments short and thick; anthers 2-celled, or if stamens 3, the lateral 1-celled. *Female* flowers :—perianth 0 or with a 3-toothed limb adnate to the ovary. *Ovary* inferior, 1-celled; style short; ovule 1, orthotropous, pendulous. *Drupe* small, ovoid or globose. *Seeds* fleshy, membranous; albumen copious, fleshy; embryo minute; radicle inferior.

CHLORANTHUS Swartz.

Perennial herbs or shrubs, the stamens articulate at the nodes. *Flowers* in terminal simple or paniced spike.

Male & Female flowers connate in pairs on a bract at the base. *Stamens* 1 or 3, confluent, if 3, central anther 2-celled, the laterals 1-celled. *Ovary* naked; stigma subsessile, truncate.

Leaves finely serrate :—

Stamens 3. Fruit white. 1. *C. officinalis*.

Leaves coarsely and deeply serrate :—

Stamen 1. Fruit red. 2. *C. brachystachyus*

1. *Chloranthus officinalis* Bl.

An undershrub 4-5 ft. long, glabrous; stem greenish-black, shining. *Leaves* 2·5-5·5 by 1-3 in., elliptic or elliptic-lanceolate, acuminate, glandular, membranous, serrulate; petiole ·05-·3 in. long. *Flowers* very small, white. *Bracts* sheathing. *Stamens* 3, connate by connectives. *Fruit* succulent, white.

KHASI HILLS.

Flrs. 6-7. Fr. 9-10.

2. *Chloranthus brachystachyus* Bl. Vern. *Tiw-kibakhabor*, *Tew-pathai-khobor*, Khasi; *Jakhi*, Synt.

A shrub, about 8 ft. high, woody, growing in intense shade. *Leaves* 1-6·5 by ·5-3 in., elliptic or elliptic-lanceolate, acuminate, coarsely and deeply glandular-serrate, membranous; petiole about ·2 in. long. *Stamens* 1. *Fruit* globose, red.

KHASI HILLS.

Flrs. and Fr. 8-3.

FAM. 114. MYRISTICACEÆ

Evergreen trees or shrubs, often aromatic and stellately tomentose. *Leaves* entire, exstipulate, alternate, often distichous, pellucid-punctate. *Flowers* small, regular, usually diœcious, fascicled, paniculate or umbellate; bracteoles persistent or caducous. *Perianth* gamophyllous, deciduous, inferior, usually 3 (2 or 4)-lobed, valvate in bud. MALE FLOWERS : *Stamens* monadelphous, 3-18 (less often 30-45); anthers usually sessile on a sessile or stipitate column or disk. FEMALE FLOWERS : *Staminodes* 0 or rare. *Ovary* superior, free, sessile, 1-celled; ovule 1, basal, erect, anatropous; stigma capitate, discoid or lobed. *Fruit* more or less fleshy, splitting into 2 rarely 4 valves. *Seeds* erect, enclosed in a fleshy or membranous, entire, lobed or laciniate, coloured, often aromatic aril; testa usually thick; albumen copious, hard, ruminant; embryo small, basal; cotyledons divaricate, flat or crumpled; radicle short, inferior.

Hairs peculiar. The branches or ends of the cells spreading out in 2 or several directions often giving the appearance of stellate hairs. "Med.-rays numerous, fine. The bark of most species contain long sacs filled with brown or red juice"—(Brandis).

Myristica fragrans Houtt is the Nutmeg tree of the E. Moluccas.

Warburg in his *Monographie der Myristicaceae* Halle, 1897 has split up *Myristica* Linn. into several genera. Brandis has retained the generic name *Myristica* adopting the generic name of Warburg as sections (*Myristica*, *Horsfieldia*, *Gymnacranthera*, *Knema*). Gamble has accepted the generic names of Warburg in his "Flora of the Presidency of Madras."

I have however followed King (*Annals R. B. G. Cal.* Vol. III) and Brandis and kept the old generic name *Myristica* but give below the nomenclature after Warburg.

Myristica contorta Warb. Syn. *M. laurifolia* Hk. f. & T.

Horsfieldia amygdalina (Wall) Warb.—Syn. *M. amygdalina* Wall.

H. Kingii (Hk. f.) Warb.—Syn. *M. Kingii* Hk. f.

Knema linifolia (Roxb.) Warb.—Syn. *M. linifolia* Roxb.

Knema angustifolia (Roxb.) Warb.—Syn. *M. longifolia* Wall.

including *M. erratica* Hk. f. & *M. gibbosa* Hk. f.

Knema malayana Warb.—Syn. *M. glaucescens* Hk. f.

MYRISTICA Linn.

Flower urceolate or campanulate; anthers 12-30, linear, adnate to a column, which is often stipitate and frequently prolonged beyond the anthers, stigmas sessile. *Bracteoles* appressed to the perianth. *Arillus* laciniate to the base.— (after Brandis)

- I. Flowers urceolate or campanulate; anthers 12-30, linear, adnate to a column which is often stipitate, frequently prolonged beyond the anthers; stigma sessile; bracteole opposed to the perianth :—
 Arils laciniate to the base. 1. *M. laurifolia*.
- II. Flowers small, globose; anthers 12-30; stigma minute, sessile :—
 Arils not frequently laciniate; bracteoles 0; staminal column sessile :—
 Panicles more or less tomentose; aril entire. 2. *M. Kingii*.
 Panicles glabrous; aril laciniate at the apex. 3. *M. amygdalina*.
- III. Flowers obconical or subglobose; anthers 8-20, sessile or nearly so, attached by their base stellately to a peltate usually stipitate column formed of the connate filaments :—
 Male flowers more than .16 in. across :—
 Young parts densely brown tomentose :—
 Fruit often solitary, 1.5 in. long. 4. *M. linifolia*.
 Young parts sparsely hairy :—
 Fruit not solitary (2-3), .75 in. long. 5. *M. angustifolia*.
 Male flowers less than .16 in. across :—
 Branchlets hoary :—
 Leaves narrow-oblong :—
 Fruit ovoid or globose. 6. *M. glaucescens*.
 Branchlets glabrous :—
 Leaves linear-lanceolate :—
 Fruit oblong, gibbous at base. 7. *M. gibbosa*.

1. *Myristica laurifolia* Hk.f. Vern. Jaiphal, Beng.

A tall evergreen tree; young parts rusty-tomentose, narrow-oblong or elliptic-lanceolate, acute or subacute, coriaceous, tough, glabrous; lateral nerves 15-23 on either half,

impressed above; base acute or cuneate; petiole $\cdot 5\text{--}1\cdot 2$ in. long. *Male* flowers crowded (6-20) on short axillary peduncle; perianth cylindrical, supported by an ovate bract at the base. *Staminal* column shorter than the perianth. *Female* flowers sessile in axillary few-flowered cymes. *Perianth* pubescent outside, more or less urceolate; stigma sessile. *Fruit* ellipsoid or globose, 2-3 in. long; arillus deeply cut into lobes, which are again divided into lacinate segments almost enclosing the seed.

KHASI HILLS.

Flrs. 10-2. Fr. 6-7.

2. *Myristica Kingii* Hk.f. Vern. *Amol*, Ass.; *Mijing-ikum-asing*, Miri; *Pandikachoa-phang*, Kach.; *Siltui*, Lushai; *Bolong*, *Bolouchi*, Garo.

A tree (70'/55"); young shoots pubescent. *Bark* grey or brownish, somewhat rough outside with shallow vertical furrows exfoliating in square flakes, $\cdot 25$ in. thick, reddish inside with streaks of lighter tissue, $\cdot 25$ in. apart, sometimes turning deeper red and exuding blood-red juice; branches horizontal, usually crowded near the top of the tree; young shoots pubescent. *Leaves* 3-9 by 2-4 in., elliptic-obovate or oblanceolate, acute or bluntly acuminate, coriaceous, glabrous; lateral nerves 10-18 on either half; base cuneate or rounded; petiole $\cdot 3\text{--}\cdot 5$ in. long. *Perianth* $\cdot 12\text{--}\cdot 13$ in. in diameter. *Ovary* sessile, obovate or ovate; stigma small. *Fruit* 1-5 in. long, supported by a persistent perianth; aril entire, completely enveloping the ovoid smooth seed.

Throughout the Province (except KHASI HILLS).

Kernel of the fruits is used as a substitute for arecanut. The gum is good for mouth sores.

Flrs. Rainy season. Fr. 2-4.

3. *Myristica amygdalina* Wall. Vern. *Dieng-soh-jodao*, *Dieng-ja-lyntep*, Khasi; *Pakna-kala*, Cach.; *Bolchok-pok*, Garo; *Dettakarong*, *Pran-dang-arong*, Mik.; *Ching-liang-pai*, Naga.

A tall tree (65'/72"), glabrous. *Bark* brown, rough outside, slightly split vertically, $\cdot 3$ in. thick, inside light-

reddish brown, soft, fibrous with white streaks turning dark-brown, exuding reddish juice. *Leaves* aromatic (mango smell) 4-10·5 by 1·4 in., entire, elliptic to elliptic-lanceolate, acute or obtuse, thinly coriaceous (Brandis and King—membranous, but I find the Assam specimens thinly coriaceous to coriaceous according to different localities) glabrous, shining above; lateral nerves 8-15 on either half; petiole ·5-·9 in. long, panicles branched and spreading. *Flower* buds yellow. *Perianth* ·06-·9 in. across. *Ovary* sessile, apiculate, hooked, glabrous. *Fruit* obscurely trigonous, ovoid, 1·3-2 in. long, with a longitudinal ridge on back and a shallow channel on the opposite side; aril thin, fleshy, yellowish, laciniate from the apex. *Seeds* ·8 in. long, oblong-cylindric.

SIBSAGAR, CACHAR, N.C. HILLS, LUSHAI HILLS, GOAL-PARA, GARO HILLS and on the foot of KHASI HILLS.

Seeds are edible and the aril is eaten by Mikirs.

Flrs. Cold season. Fr. 1-5.

4. *Myristica linifolia* Roxb. = *Myristica longifolia* Wall. Vern. *Tagling-asing*, Abor; *Se*, Manipur; *Tring-chi*, Lushai; *Garobhala*, Ass.; *Dieng-soh-langor-shri*, *Dieng-soh-slung*, *Dieng-tyrkhou*, Kh.; *Chekulo-arong*, Mik.; *Duingkim-chi-ching*, Naga; *Bolanchi*, Garo.

A lofty tree (60'/62''); young parts densely tomentose. *Bark* rough, greyish-brown with horizontal wrinkles and light vertical fissures, ·3 in. thick, reddish-brown inside, fibrous, exuding profusely a blood-red juice. *Leaves* 12-20 by 2-5 in. or more, elliptic-oblong, narrow-oblong or ovate-oblong, acute or obtuse, entire, coriaceous, glabrous (covered above with a loose, brown, stellate tomentum which rubs off easily) glaucous beneath; lateral nerves 18-35 on either half, conspicuous, almost parallel, anastomising under the margins; base rounded or shallow cordate; petiole ·3-1·2 in. long. *Male* flowers salmon pink, about ·3 in. across, fascicled on a tubercle. *Stamens* 12-18; bracteoles small on the pedicel near the middle or below, oblong-ovoid. *Fruit* 1·5-2 in. long, solitary, ellipsoid, velvety; aril covering the whole seed, thin, pale-yellow, lobed.

N.-E. F. TRACT, SIBSAGAR, KAMRUP, CACHAR, SYLHET, N. C. HILLS, LUSHAI HILLS, GARO HILLS, K. & J. HILLS.

Wood cream coloured, used for house building (away from contact with the ground or rains) Juice caustic. Sap and smoke often produce sores.

5. *Myristica angustifoila* Roxb. = *Myristica erratica* Hk. f. = *Myristica longifolia* Wall. Var. *erratica* F.B.I. Vern. *Tezranga*, Mamui, *Mota-pasuti*, Ass.; *Bol-lanchi*, Garo; *Bonsigejao*, Kach.; *Dieng-soh-lang-snam*, Khasi; *Chekpularong*, Mik.; *Indung*, Tipp.

A lofty tree (65'/45''); young parts slightly hairy. *Bark* greyish-brown with white patches, exfoliating in large flakes, thin; reddish inside, exuding copious blood-red juice. *Branches* crowded at the top at right angles with stem. *Leaves* 4-16 by 1·2-3·5 in., bifarious, elliptic to oblong-lanceolate, obovate-elliptic or ovate-oblong, entire, acute or acuminate, thinly coriaceous, glabrous, pale beneath (covered with a caducous, stellate tomentum); lateral nerves 19-30 on either half, conspicuous; base cuneate or rounded; petiole ·3-·7 in. long. *Perianth* of male flowers, ·2-·25 in.; pedicel usually longer than the flower; bracteoles inserted above the middle of the pedicel. *Fruit* ·75-1·2 in. long, 2-3 on axillary woody tubercles; aril membranous.

SIBSAGAR, LAKHIMPUR, GOALPARA, CACHAR, SYLHET, N. C. HILLS, GARO HILLS, K. & J. HILLS.

Juice is applied to sores in the mouth. Gum is used as a medicine for dysentery in Garo Hills.

Flrs. 11-12. Fr. 1-4.

6. *Myristica glaucescens* Hk. f.

A tree. *Young* parts rufous pubescent. *Leaves* 3-8 by 1-2 in., oblong-lanceolate or elliptic-lanceolate, acute or acuminate, chartaceous, glabrous above, glabrescent beneath; lateral nerves 12-24 on either half, almost parallel, prominent beneath; base obtuse or sub-acuminate; petiole ·3-·6 in. long. *Male* flowers ·1-·16 in. across, in sub-sessile, pubescent, umbellate, 5-8 flowered clusters axillary or from tubercles. *Perianth* lobes 3; anthers 10-12, inserted radically

on a flattened disc. *Female* flowers in fewer flowered umbels. *Ovary* sessile, globose; stigma peltate, 4-lobed. *Fruit* ovoid or obovoid, about 1 in. long, rusty-tomentose; aril thin.

SIBSAGAR.

Flrs. 12-1. Fr. 2-4.

7. *Myristica gibbosa* Hk. f. & T.

A tree; branchlets slender, horizontal, glabrous; crown small, spherical. *Leaves* 3-9 by 1-2·5 in., narrow-lanceolate, oblong-lanceolate or elliptic-lanceolate, acute or acuminate, thinly coriaceous, glabrous above, glaucescent beneath; lateral nerves 16-24 on either half, brownish; base acute or obtuse; petiole ·3-·7 in. long. *Male* flowers in fascicles. *Perianth* deeply divided into 3 triangular teeth, rufous tomentose outside, glabrous inside; anthers 10-12, on an almost concave disc. *Fruit* 1-1·5 in. long, gibbous at the base, ovoid, rufous-tomentose; aril almost entire, thin.

CACHAR, LAKHIMPUR, NAGA HILLS, K. & J. HILLS, (3,000 ft.).

Flrs. 12-2. Fr. 3-5.

"Probably a variety (of *M. angustifolia* Roxb. with the fruit gibbous at the base"—Brandis).

FAM. 115. LAURACEÆ

Erect, aromatic trees or shrubs, rarely leafless twinning parasites, mostly evergreen. *Leaves* alternate, exstipulate, rarely opposite or sub-opposite, often crowded at the ends of branches, gland-dotted, glands often visible as minute pellucid dots, usually entire, lobed. *Flowers* regular, small, hermaphrodite or diœcious, in axillary or lateral cymes, clusters, racemes or panicles; bracts 0 or deciduous, often

involucre-like; perianth usually inferior, often connate in a short tube below; lobes usually in two whorls of 3 each, rarely more or less imbricate or subvalvate, equal or unequal, deciduous or persistent in fruit, sometimes enlarged. *Stamens* usually in 2-4 series on the perianth tube of 3 each, one of which is reduced to staminodes, perigynous or hypogynous; filaments usually flattened, those of the inner series often with 2 large glands each at the base; anthers continuous with filaments, 2- or 4-celled, rarely 1-celled, opening by as many valves which are deciduous from the base upwards; in female flowers the stamens are reduced to usually linear or clavate staminodes, the inner bi-glandular as in males. *Ovary* 1-celled; style terminal; stigma often 3-lobed, discoid or dilated; ovule 1, anatropous, pendulous from the apex of the cell. *Fruit* a dry or fleshy berry or drupe, often surrounded at the base by the enlarged receptacle or by the base of the perianth tube, and supported by the thickened pedicel, rarely enclosed in or adnate to the perianth tube. *Seeds* exalbuminous; testa membranous; cotyledons plano-convex; embryo straight, radicle minute, superior.

Trees or shrubs :—

Stamens of 3rd row (if present), extrorse :—

Flowers usually hermaphrodite, rarely polygamous :—

Anthers 2-celled :—

Stamens of 3 rows perfect :—

Perianth accrescent and persistent,
enclosing the fruit. 1. **Cryptocarya.**

Perianth deciduous :—

Perianth lobes unequal :—

Pedicel thickened, coloured in
fruit. 2. **Dehaasia.**

Perianth lobes equal :—

Pedicel not thickened in fruit. 3. **Beilschmiedia.**

Stamens of rows 1 & 2 **absent** :—

Perianth segments 6 :—

Perfect stamens 3. 4. **Endiandra.**

Anthers 4-celled, fertile. Stamens usually 9 :—

Leaves usually opposite and terminal :—

Perianth in fruit with persistent
usually enlarged tube and usually
deciduous segments. 5. **Cinnamomum.**

Leaves alternate :—

Perianth segments deciduous.

Fruit on enlarged fleshy pedicels. .. **6. Alseodaphne.**

Perianth segments persistent; pedicels hardy, enlarged :—

Perianth segments reflexed. .. **7. Machilus.**

Perianth segments erect, clasping the base of the fruit. .. **8. Phœbe.**

Stamens all introrse :—

Flowers usually diœcious :—

Anthers 4-celled; fertile stamens 9 or more :—

Bracts imbricate, deciduous :—

Leaves sub-whorled. .. **9. Actinodaphne.**

Bracts whorled, (involucrate), persistent :—

Leaves alternate or sub-opposite, penni-nerved, fertile stamens 9 or 12. **10. Litsæa.**

Bracts (involucrate) early deciduous :—

Leaves alternate or sub-verticillate tripli-nerved, fertile stamens 6. .. **11. Neolitsea.**

Flowers bisexual :—

Anthers 4-celled, perfect stamens 10-15 :—

Fruit on the flat perianth tube. .. **12. Dodecadenia.**

Anthers usually 2-celled. Stamens 9-12 :—

Fruit on the unaltered perianth tube. **13. Lindera.**

Flowers small, hermaphrodite :—

Anthers 2-celled; stamens (perfect) 6, adnate to the perianth tube, perianth 6-partite. .. **14. Purkayasthæa.**

Twining filiform parasite :—

Leafless; stamens with 4-celled anthers, outer

2-rows introrse, inner rows extrorse. .. **15. Cassytha.**

***Persea gratissima* Gærtn.** is the *Avocado Pear* of the West Indies sometimes found in cultivation for the pleasant edible fruit.

1. CRYPTO-CARYA R. Br.

Evergreen trees or shrubs. *Leaves* usually alternate, penni-nerved or 3-ribbed, more or less coriaceous. *Flowers* small, hermaphrodite, in axillary or subterminal pedunculate panicles. *Perianth* tube turbinate or ovoid, after flowering constricted at the top; lobes 6, sub-equal. *Perfect* stamens 9 in three series, those of the first and second series eglandular, introrse, of the third series extrorse, each with 2 glands; anthers 2-celled, interior to the stamens there is

a fourth series of stipitate cordate staminodes. *Ovary* sessile at the bottom of the perianth tube in which it is enclosed; style shortly exserted; stigma obtuse or capitate. *Fruit* oblong or globose, smooth or ribbed, wholly included, in accrescent hardened or fleshy perianth tube; pericarp membranous or thinly crustaceous more or less free from the perianth tube. *Seeds* with a membranous testa, not often separable from the pericarp; cotyledons thick, fleshy; radicle minute.

The glands are described by some authors Bentham (Fl. austral V. 294) and Koorders and Valcton (Bijdr. X, 211). Gamble (Flora of Madras) as free and alternate with the stamens of the first and second series. They are slightly in front of the stamens of the first and second series and slightly behind those of the third series.

Outer coat of fruit smooth, not ribbed :—

Leaves medium sized, 1.3-2 in. broad; fruit

·7-1 in. long. 1. *C. amygdalina*.

Leaves large, 3.5-8 in. broad; fruit 1.5-2.5

in. long. 2. *C. Andersoni*.

1. *Cryptocarya amygdalina* Nees. Vern. *Bonsum*, *Bonjolukia*, *Kharika-chapa*, *Bonhon-alu*, Ass.; *Pumrong-asing*, Miri; *Mugachala-buphang*, Kach.; *Sutrong*, Cach.; *Tundur*, Manip.; *Kalak-thiang*, Naga; *Nami-aga*, *Dalgappa*, Garo.

Usually a medium sized tree, with spreading crown but sometimes (100'/55"). *Bark* dark brown with fine reticulating vertical fissures; blaze aromatic, reddish brown with streaks, turning deeper brown on exposure; branchlets puberulous or pubescent. *Leaves* 4.5-8 by 1.2-3.5 in., oblong-lanceolate to elliptic or oblanceolate, shortly acuminate, acute or obtuse, thinly coriaceous, shining above, green on both surfaces, glabrous or nearly so; base acute or obtuse; lateral nerves 6-7 on either half, distant; petiole upto .7 in. long. *Panicles* terminal and from upper axils, pubescent, long peduncled, often large and much branched; pedicels pubescent, very short, joined; bracts caducous, linear; lower larger, lanceolate, silky-villous, .1-·2 in. long. *Flowers* about .15 in. across, and as long, tomentose outside; perianth tube about as long as the lobes; segments oblong or elliptic, acute

or obtuse. *Fruit* .7-1 by .4-5 in., strongly ribbed when very young, finally smooth, pointed at either end, turgid, aromatic.

Throughout the Province. The timber is used for tea boxes but has been to a great extent replaced by three-ply wood.

Flrs. 3. Fr. 11.

C. floribunda Nees. has been united with the above in F.B.I. It occurs in Sibsagar, and other district of Upper Assam. Kanjilal's sheet No. 2104, Purkayastha, (Forest Research Institute sheets Nos. 60272 & 61807) from Jorhat, and also in Khasi and Garo Hills. It differs from *C. amygdalina* Nees in the following characters:—

Leaves papillose beneath, rather thick, undersurface glaucous; lateral nerves 6-10 pairs. *Young* fruits much broader below than above.

In Calcutta herbarium *C. floribunda* is shown as a distinct species.

2. Cryptocarya Andersoni King. Vern. *Bon-honwalu*, *Daukhi-poma*, Ass.; *Bol-dujong*, *Boludom*, *Waksiring Boljadong*, *Bolkhumchhari*, *Bolong-bolanchi*; Garo; *Bon-dau-iongphang*, Kach.

A large tree. *Bark* rough, dark brown or grey with more or less vertical fissures exfoliating in oblong flakes, .5-.75 in., thick; blaze light brown or reddish brown, slightly aromatic; young shoots ferruginous-tomentose. *Leaves* 7-15 by 3.5-8 in., elliptic to elliptic-obovate, shortly and usually abruptly acuminate, coriaceous, glabrous and shining above, undersurface reddish brown, pubescent along the nerves when young, glabrate with age; base acute; lateral nerves prominent, 10-12 on either side, nearly straight; tertiaries subparallel; petiole stout; 1.3-3 in. long. *Panicles* large, upto 12 in. long, long peduncled, pubescent; pedicels very short, grey or fuscous-tomentose; bracts caducous, linear-lanceolate, tomentose, about .15 in. across and about .12 in. long. *Flowers* very small, grey or dun tomentose outside. *Perianth* segment ovate to elliptic, obtuse or sub-acute. *Stamens* hairy. *Fruit* 1.5-2.5 by about .7-1.3 in., smooth, ellipsoid or oblong; bright, blue-black when ripe; fruiting pedicels red, much thickened.

LAKHIMPUR, KHASI HILLS, upto 2,700 ft. GARO HILLS, common, N. CACHAR HILLS, DARRANG.

The wood is cream coloured and tough, not used.

Flrs. 6. Fr. 1-3.

3. BEILSCHMIEDIA Nees.

Evergreen trees or shrubs. *Leaves* alternate or opposite, penninerved. *Flowers* usually small, 2-sexual, panicled or sometimes solitary. *Perianth* tube short, lobes 6, subequal. *Perfect* stamens 9, in the first and second series eglandular with introrse anthers; in the 3rd series 2 glandular with extrorse anthers; in the fourth series staminodes ovate or cordate. *Ovary* free, attenuate in the style; stigma obtuse. *Fruit* ovoid, oblong or globose; perianth quite deciduous in fruit leaving a narrow ring; cotyledons fleshy, often with a rudimentary dissepiment between them.

Leaves mostly alternate, terminal buds small, pubescent or tomentose, not enclosed in coriaceous scales :—

Inflorescence pubescent :—

Panicles or racemes short, usually less than 1.5 in. long. Perianth segments linear-oblong. Fruit usually .8-1.5 in. long. .. 1. *B. Roxburghiana*.

Panicles or racemes upto 2 in. long. Perianth segments broad-ovate, rounded or obtuse. Fruit 2.2-5 in. long. 2. *B. Brandisii*.

Leaves mostly opposite, terminal buds enclosed in large coriaceous concave scales :—

All parts glabrous :—

Fruit oblong or elliptic-oblong, not apiculate; terminal buds lanceolate. .. 3. *B. assamica*.

Fruit globose-obovoid, apiculate; terminal buds ovoid. 4. *B. Gammieana*.

1. Beilschmiedia Roxburghiana Nees. Vern. *Theng-lokso-arong*, *Chelaban-arong*, Mik.; *Dieng-soh-long-ar-khlaw*, Khasi.

A medium sized evergreen umbrageous tree. *Bark* nearly white to grey or greyish brown, rather rough, .25-.6 in. thick; blaze reddish brown, turning deeper brown on exposure; young parts brown silky-tomentose. *Leaves* alternate or sub-opposite, crowded at the ends of branches, 3-7

by 1·3·2 in., oblong to elliptic-lanceolate or elliptic-oblong, bluntly short-acuminate or obtuse, glabrous, coriaceous, narrowed at the base into the petiole; lateral nerves 6-12 on either half with prominently reticulating raised nervules between; petiole channelled, ·5-1·2 in. long. *Flowers* small, ·2 in. long and about ·25 in. across, yellowish green, in short, silky, few flowered, peduncled panicles or racemes, which are axillary or from axils of fallen leaves or lateral from the axils of caducous scales and ·5-1·5 in. long; bracts deciduous, small, broad, silky. *Perianth* deeply divided; lobes oblong-acute, pubescent on both surfaces. *Filaments* hairy, glands of 3rd row of stamens about as large as the ovoid staminodes. *Ovary* glabrous. *Fruit* baccate, obovoid-oblong, ·8-1·5 in. long, dark purple when ripe.

Throughout the Province.

The leaves are sometimes upto 10 in. long.

Flrs. 3-5 with new leaves. Fr. rainy season.

B. fagifolia Nees, is scarcely more than a form of the above. The bark is usually more smooth, leaves are sometimes puberulous and the flowers are enclosed by caducous, broad, usually ovate silky bracts ·15·25 in. long.

This character is not in correlation with constant reduction in the size of the leaf as mentioned (Hooker in Flora of British India).

SIBSAGAR, KAMRUP, GOALPARA, probably all over the province.

2. Beilschmiedia Brandisii Hook.f. Vern. Bangla. Mech; *Leluk, Bonhualu, Harupadrai*, Ass.; *Dieng-soh-khyllambam-skei*, Khasi; *Theng-lokso-arong*, Mik.

A moderate to medium-sized tree with slightly rough, light grey nearly white bark about ·3·5 in. thick, pale or reddish brown inside, turning darker on exposure; buds silky-tomentose. *Leaves* alternate to sub-opposite, 3·5-8 by 1·3-3 in., elliptic-oblong to elliptic or lanceolate, bluntly short-acuminate, thinly coriaceous, glabrous, narrowed and usually acute or cuneate at the base; main lateral nerves slender, 8-10 on either side, curved near the margins; tertiaries prominent beneath; petiole ·5 in. long, channelled. *Panicles* axillary or lateral upto 2·25 in. long. pubescent. *Flowers* about ·2 in. across. *Perianth* segments broadly

ovate, rounded or obtuse, pubescent outside. *Ovary* glabrous. *Anthers* glabrous. *Fruit* baccate, 2.2-5 in. long by .8-1 in. across, oblong, glabrous, blue-black when ripe; fruiting peduncles stout.

LAKHIMPUR, DARRANG, SIBSAGAR, KAMRUP, KHASI & JAINTIA HILLS below 2,000 ft., GARO HILLS, GOALPARA, probably throughout the province.

Flrs. 12-2. Fr. 3-5.

3. *Beilschmiedia assamica* Meissn. Vern. *Tagong-asing*, Miri & Abor; *Gurgum-datki*, Miri; *Malaisi*, Mishmi; *Dhosra*, Nep.; *Naga-sutrong*, Sylh.; *Vamum-sappar*, Tipp.; *Amchoi*, *Kanthalpatia*, Ass.; *Sangtemchange* Duff.; *Horganme*, Garo; *Dieng-kha-lang*, Kh.

A very large tree. *Bark* light grey, almost white to brownish grey or brown, nearly smooth with horizontal wrinkles or slightly rough in old trees, .3-.5 in. thick; blaze soft, reddish brown or brown, turning deep brown on exposure; all parts glabrous; terminal buds lanceolate upto .5 in. long, enclosed in linear-oblong or lanceolate, glabrous, coriaceous scales. *Leaves* opposite or sub-opposite, approximate on the shoots, 3-8 by 1.3-3.5 in., elliptic-oblong, lanceolate or elliptic, shortly blunt-acuminate, firmly coriaceous, often pellucid-punctate; main lateral nerves 8-12 on either side, prominent on both surfaces; base cuneate, petiole .4-.7 in. long. *Panicles* usually shorter than the leaves, rarely longer, glabrous. *Flowers* not seen. *Fruit* 1.1-7 by .6-.8 in., elliptic or ovoid-oblong; base shortly contracted, black when ripe.

Throughout the area ascending to 3,000 ft. in the KHASI HILLS.

An excellent firewood. The timber is used sometime for boats but does not last.

The larger leaved form is probably a different variety but I am unable to separate it with the materials I have examined.

Flrs. buds. 12. Fr. 2-3.

4. *Beilschmiedia Gammieana* King. Vern. *Dieng-la-pylleng*, Kh.

A medium sized tree with spreading branches. *Bark* light or greenish-grey to yellowish brown, nearly smooth,

about .3 in. thick; blaze brown, all parts glabrous; terminal buds ovoid, upto .3 in., enclosed in coriaceous scales. *Leaves* opposite or sub-opposite, 4-6 in., oblong-lanceolate, elliptic-oblong or ovate, obtusely acuminate, firmly coriaceous; base cuneate or attenuate to the petiole, lateral nerves slender, 10-15 on either side; petiole .25-.5 in. long. *Panicles* or racemes very short, upto 1 in. long. *Flowers* not seen. *Fruit* .75-1.2 by .75 in., globose-obovoid, shortly apiculate; base shortly contracted.

KHASI HILLS, 5-6,500 ft., LAKHIMPUR, Jeypore (Sheet No. 3390 but the specimen is rather incomplete).

Flrs. 3-5. Fr. 11.

4. ENDIANDRA Brown.

Endiandra firma Nees.

An evergreen tree; terminal buds thinly silky. *Leaves* alternate, 4.5-7 by 1.3-1.8 in., elliptic-oblong, acuminate, glabrous, concolorous, green; main lateral nerves upto 11 on either half, obliquely arcuate; petiole stout, about .5 in. long. *Flowers* about .25 in. across, bisexual, pedicellate in short axillary panicles 1-2 in. long; branches spreading, puberulous; bracteoles minute. *Perianth* tube very short, tomentose at the base within; segments 6, in two series, broadly ovate-obtuse, usually ciliolate, glabrous outside; outer 3 broader, tomentose within near the base; inner three tomentose within. *Anthers* 3, sessile, thick, narrowly sub-sagittate, tomentose, extrorsely 2-locular, valves oblong. *Fruit* not seen, (according to Hooker 1.25 in. long) elliptic-ovoid with rounded tip.

CACHAR—Keenan, SYLHET, (De Silva).

Flrs. 10-11.

5. CINNAMOMUM Blume.

Evergreen trees or shrubs. *Leaves* alternate or opposite, usually with three strong basal nerves. *Flowers* small, 2-sexual or polygamous with larger females in axillary and sub-terminal panicles. *Perianth* tube short; segments sub-equal. *Perfect* stamens 9 or fewer; filaments of first and

second series eglandular with introrse 4-celled anthers of the 3rd, 2-glandular with extrorse 4-(rarely 2) celled anthers; staminodes of the fourth series cordate or sagittate. *Fruit* seated on the enlarged perianth, the segments of which are wholly or partly deciduous or very rarely persistent and entire.

Leaf buds with small scales :—

Leaves usually opposite :—

Leaves triple-nerved at base, glabrous :—

Buds and young shoots more or less silky :—

Leaves 2·5-6 in. long, coriaceous :—

Panicles about as long as the leaves. 1. *C. Tamala.*

Leaves 6-12 in. long, thickly coriaceous :—

Panicles usually exceeding the leaves. 2. *C. obtusifolium.*

Buds and young shoots glabrous :—

Leaves ovate, 2·4-5 in. long :—

Panicles few flowered. 3. *C. pauciflorum.*

Leaves alternate :—

Leaves orbicular or elliptic, 2·5-4·5 in., caudate-acuminate, 3-5-nerved :—

Flowers in few flowered short cymes. .. 4. *C. caudatum.*

Leaves lanceolate, 3-6 in. long, 3-nerved :—

Flowers in long panicles. 5. *C. cacharensis.*

Leaf buds enlarged in large, silky, orbicular concave, imbricate, deciduous scales :—

Leaves alternate, penninerved :—

Panicles crowded, densely tomentose :—

Fruit ellipsoid or oblong, ·6-1·25 in. long. 6. *C. Cecicodaphne.*

Panicles few flowered, nearly glabrous :—

Fruit obovoid, about 1 in. long. .. 7. *C. glanduliferum.*

Panicles glabrous :—

Leaves 2·5-4 in. long :—

Fruit sub-globose, ·5 in. long; seated on the thickened pedicel and cup-shaped base of the perianth. 8. *C. Camphora.*

Panicles glabrous or nearly so :—

Leaves 2·5-7 in. long :—

Fruit globose, ·5-·7 in. long; seated on the expanded perianth cup. 9. *C. Parthenoxylon.*

C. zeylanicum Blume is the *Cinnamon* of S. India; sometimes cultivated.

1. Cinnamomum Tamala Fr. Nees. Vern. *Jonkeng-asing*, *Rapi-asing*, Abor; *Diend-la-tyrpat*, *Dieng-myrao-kasla-tyrdop*, *Dieng-sia-sia*, Kh., *Huara*, *Tejpata*, Sylh.; *Tarpalai-king*, Tipp.; *Tejpat* or *Teji-bol*, Garo; *Tej-pat*, Ass.

A medium-sized branchy tree. *Bark* rather rough, dark grey, almost black or dark brown; blaze aromatic, reddish brown, darkening on exposure. *Leaves* alternate, sub-opposite or opposite on the same twig, 2·5-6 by 1·2-5 in., ovate-oblong or elliptic to oblong-lanceolate, acuminate with the tip, often subfalcate or acute, glabrous, pink when young; base sub-triplinerved; tertiary nerves fine, sub-parallel; petiole ·3-·5 in. long. *Panicle* about as long as the leaves or slightly exceeding them; branches and pedicels grey pubescent; pedicels ·15-·2 in. long. *Flowers* about ·3 in. across. *Perianth* silky; segments subequal, upto ·2 in. long, oblong or elliptic-oblong, silky-pubescent on both surfaces, longitudinally ribbed, breaking off below the middle in fruit. *Stamens* villous. *Ovary* free, villous; style glabrous, filiform. *Drupe* black when ripe, ·5 in long, ovoid, supported by the thickened peduncle and the enlarged truncate toothed base of the perianth.

Throughout the Province ascending to 6,000 ft. in the KHASI HILLS.

The leaves are *Tejpat* of commerce. The bark is used as a substitute for cinnamon.

Flrs. 2-5. Fr. 6-10. New leaves 3-5.

2. Cinnamomum obtusifolium Nees. Vern. *Chhamejam* or *Chhamejong*, *Sami-jang*, Garo; *Dieng-la-si-sirmot*, *Dieng-la-tyrdop*, *Dieng-lassi*, *Dieng-pathi*, Kh.; *Pati-hunda*, *Paderai*, *Naga-dal-chini*, Ass.; *Dhupati-jola*, Mech; *Luteron*, *Theng-kichi-arong*, *Theng-kiching-alo*, Mik.; *Seerang-asing*, Miri; *Barbak-changne*, Duff.; *Laimakhau-buphang*, Kach.

A large tree. *Bark* grey or brownish white, rough, upto ·75 in. thick; blaze aromatic, yellowish or pale brown, turning darker brown on exposure. *Leaves* 6-12 by 1·5-3·5 in., elliptic-oblong or elliptic, obtuse, acute or acuminate, glabrous, sometimes glaucous beneath, very coriaceous; base 3-nerved; nervules rather prominently reticulate beneath;

petiole stout, .5-.7 in. long. *Panicles* large, long peduncled, subterminal, usually exceeding the leaves, minutely pubescent or puberulous, glabrate with age; branches more persistently pubescent; pedicles short, upto .5 in. long, usually hoary with silky pubescence. *Perianth* about .25 in. across; lobes silky on both surfaces; of the inner 3 usually villous, all persistent in fruit, elliptic or ovate. *Stamens* and ovary sharply pubescent. *Fruit* .3-.5 in. long, ellipsoid or subglobose, seated on the slightly enlarged perianth.

Throughout the Province.

In some forms the leaves attain 15 by 5 in.; the basal nerves arising about 1 in. from the base.

Flrs. 1-3. Fr. Rainy season.

3. *Cinnamomum pauciflorum* Nees. Vern. *Barhit-chuon*, Kuki; *Diend-torthia*, Kh.

A large shrub or a small tree; branches more or less quadrangular, glabrous. *Bark* grey with streaks of brown on stem, green on branches; young shoots and leaf buds glabrous. *Leaves* 2.4-5 by .7-1.75 in., elliptic-ovate, ovate-lanceolate to oblong-lanceolate, acuminate, sometimes caudate-acuminate, firmly coriaceous, usually glaucous and finely reticulated beneath; base acute, rounded or sub-cordate, usually 3-nerved, rarely 5-nerved; petioles .2-.4 in. long. *Peduncle* with 3 flowers; pedicels .25 in. long, minutely pubescent or puberulous. *Perianth* .15 in. across; segments patent, lacinate, deciduous in fruit nearly to the base, elliptic or ovate, pubescent on both surfaces; inner surface usually more densely adpressed silky. *Filaments* hairy. *Fruit* globose, about .3 in. across(?) often insect aattacked, seated on the truncate toothed accrescent base of the perianth.

KHASI HILLS 4-6.000 ft., CACHAR HILLS, Sonai Reserve.

Flrs. 5. Fr. 9.

4. *Cinnamomum caudatum* Nees. Vern. *Sasing-jola*, Kach.; *Dieng-la-pasiang*, Kh.; *Thengi-ching-alu-arong*, Mik.

A moderate sized tree (according to F. B. I. a large glabrous shrub) with zig-zag branchlets. *Bark* dark brown

or grey, exfoliating in thin roundish flakes; blaze reddish, turning reddish brown, aromatic. *Leaves* alternate, 2·5-4·5 by 1·2-3·3 in., elliptic or orbicular, obtusely caudate-acuminate, 3-5 nerved; base acute or cuneate, sometimes oblique; tertiaries fine, sub-parallel; petiole slender, ·3-·4 in. long. *Flowers* minute, ·1-·12 in. across, in short few flowered pubescent cymes, simple or arranged in panicles, axillary and terminal; pedicels slender, upto ·25 in. long. *Perianth* segments silky on both surfaces, accrescent in fruit, acute. *Filaments* very short, hairy. *Fruit* ·6-·75 in. long, bright-scarlet, ellipsoid, globose, rarely obovoid, fleshy, seated on the fleshy 6-lobed perianth cup, ·3-·5 in. across.

CACHAR, GARO HILLS, KHASI & JAINTIA HILLS—upto 3,000 ft.

Flrs. 6-9. Fr. 3. ? (apparently following year).

5. *Cinnamomum cacharensis* R. N. Parker. Vern. *Tezzia*, Cach. *C. impressinervium* Meissn.

A middle sized tree; branches terete, slender, glabrous. *Leaves* alternate, 2·8-6 by 1-2 in., sub-coriaceous, elliptic-oblong or lanceolate, acuminate, glabrous, somewhat shining above, pale (dry) ashy below; nerves 3; petiole ·2-·3 in. long. *Panicles* sub-terminal, minutely pubescent, branches angular; pedicels slender. *Perianth* tubular, short, glabrous inside; lobes ovate, ·12 in. long and ·1 in. broad outside, somewhat smaller inside, puberulous on both sides. *Stamens* spathulate. *Ovary* ovoid, glabrous; style ·05 in. long, somewhat thickened; stigma peltate, oblique. *Drupe* ellipsoid, ·5 in. long, ·3 in. across; fruiting calyx cup-shaped; fruiting pedicel obconic.

CACHAR—J. S. Owden.

(Repertorium specierum novarum XXI 1-10, 30th September, 1932).

6. *Cinnamomum Cecicodaphne* Meissn. Vern. *Molahagori*, *Mala-giri*, Nep.; *Suri-arong*, *Korn-arong*, *Ok-hi-sis-sing*, Mik.; *Kanhuroi*, Synt.; *Diend-ping-wait*, *Dieng-jape* (below Lyng-kerdem), *Lanyar-iong*, *Dieng-pynwai*, Kh.; *Gonsorai*, Ass.; *Gondroi-phang*, *Konthuri-baphang*, Bon-

khong-kharai, Kach.; *Mantun-thing*, *Thing-par-sen*, Kuki; *Than-sang*, Naga; *Gonoroi*, Manip. & Sylh.; *Gam-salu*, Garo.

A large to middle-sized tree, with dark brown or grey furrowed bark; blaze usually brown with darker streaks. *Bud* scales broadly ovate or sub-orbicular, imbricate, brown, silky tomentose; inflorescence and juvenile shoots brown tomentose; older branchlets glabrous, green. *Leaves* similar to *C. glanduliferum*, often green beneath. *Panicles* usually crowded at the base of the current year's shoots. *Flowers* densely tomentose; pedicels slightly stouter than in *C. glanduliferum*. *Fruit* .6-1.25 in. long, ellipsoid or oblong (F.B.I.) seated on the much enlarged perianth-cup.

Throughout the Province.

The timber is durable and used for furniture and boat-building.

Flrs. 2-3. Fr. 10-11.

7. *Cinnamomum glanduliferum* Meisn. Vern. *Gonsarai*, *Gonhorai*, Ass.; *Agrun-asing*, Miri; *Gonhorai-arong*, Mik.; *Yero-asing*, Abor; *Dieng-sing*, *Dieng-puin-waith*, Kh.; *Diend-salu*, Synt.; *Gonsalu*, Garo.

A large tree. *Bark* .5-.6 in. thick, dark-brown or grey, sometimes almost black, furrowed, also often with lines of large warts; inside reddish brown with streaks of lighter coloured tissue, fibrous; buds enclosed in large orbicular concave silky tomentose imbricating scales. *Leaves* alternate, very variable in size and shape, usually 2.5-5 by 1.2-2.7 in., elliptic, orbicular or lanceolate, somewhat bluntly acuminate, sometimes caudate, thickly coriaceous, often glaucous beneath; base acute or cuneate, penninerved; lateral nerves 4-6 on either side, often with punctate glands at the axils; petiole .3-1 in. long. *Panicles* axillary terminal and upto about 3 in. long, few-flowered, nearly glabrous; peduncles slender, upto .15 in. long. *Flowers* .15-.2 in. across; pedicels short. *Perianth* segments thinly pubescent outside, villous within, deciduous nearly to the base. *Stamens* hairy. *Ovary* glabrous. *Fruit* upto about 1 in. long, obovoid, seated on the fleshy perianth tube.

N. E. FRONTIER, LAKHIMPUR, SIBSAGAR, KAMRUP and upto 5,000 ft. in KHASI & JAINTIA HILLS.

Leaves turn red before falling.

The timber is durable but does not polish well. It makes strong furniture. (Insect proof).

Flrs. 6. Fr. 8.

8. *Cinnamomum Camphora* F. Nees.

A small low branched tree with spreading crown. *Bark* dark grey, almost black, furrowed; twigs glabrous. *Leaves* with a pleasant camphoraceous odour, 2·5-4 by 1·2-2 in., elliptic-lanceolate, ovate or sub-orbicular, acuminate, dark green and shining above, with a greyish or glaucous bloom on the undersurface, more or less narrowed to the petiole; base 3-nerved, nerves often with punctate glands at the axils; petiole ·5-1·5 in. long, slender. *Flowers* fragrant, pale yellowish, upto ·2 in. across in glabrous panicles towards the ends of the branches. *Glands* of the stamens yellowish. *Berry* sub-globose, black, seated on the thickened pedicel and cup-shaped base of the perianth.

Cultivated in gardens at Shillong and in many other districts but nowhere extensively.

Axis of sub-basal nerves tumid.

The *Camphor* tree of China, Japan and Formosa. The *Camphor* is distilled from chips of old wood but in cultivation in Ceylon, the *Camphor* is distilled from young shoots.

Flrs. 3-5. Fr. Rainy season.

9. *Cinnamomum Parthenoxylon* Meissn.

A large tree. *Leaves* very variable in size and shape, 2·5-7 by 1·5-3 in., ovate, lanceolate to broadly elliptic, acuminate to sub-acute or obtuse, often glaucous beneath; lateral nerves 4-6 on either side; axils often glandular punctate; petiole slender, ·7-1·2 in.; bud-scales silky. *Panicles* 1-3 in. long, nearly glabrous. *Perianth* ·1 in. across; segments glabrate outside, pubescent within, wholly deciduous. *Stamens* hairy. *Ovary* glabrous. *Fruit* globose, succulent, ·5·7 in. long, seated on the expanded perianth cup, which is ·3·5 in. across.

A native of BURMA, MALAYAN PENINSULA and the EASTERN ARCHIPELAGO. Some incomplete sheets have been provisionally

referred to this species (4423, 7792) but further material is needed for satisfactory determination. There are no specimens in Royal Botanic Garden, Calcutta.

Flrs. and Fr. 3-5.

6. ALSEODAPHNE Nees.

Evergreen trees. *Leaves* alternate, often crowded at the ends of branchlets, penninerved. *Flowers* hermaphrodite, in panicles. *Perianth-tube* short; segments 6, sub-equal or the 3 outer rather smaller. *Stamens* 9, perfect; filaments of I and II series eglandular; anthers 4-celled, introrse; of III series bi-glandular; anthers extrorse, glands at the inner base of the filaments usually free; staminodes (4th series) large, stipitate, ovate or cordate. *Ovary* ovoid; style slender; stigma peltate. *Fruit* ellipsoid or globose, seated on the club-shaped end of the thick fleshy pedicel; cotyledons fleshy.

Leaves quite glabrous :—

Leaves 7-12 in. long, elliptic or oblong, rigidly coriaceous :—

Fruit 1.5 in. long. 1. *A. petiolaris*.

Leaves 3-5 in. long, lanceolate, thinly coriaceous :—

Fruit 1-4 in. long. 2. *A. Owdenii*.

Leaves glaucescent and minutely rusty puberulous beneath :—

Leaves 5-10 in. long, sub-coriaceous. .. 3. *A. Keenani*.

1. *Alseodaphne petiolaris* Hk. f. Vern. *Dieng-soh-pydem*, Khasi; *Mekhai*, Lakhimpur; *Theng-bo-mom*, Mik.; *Labong-kroth-arong*, Mik.; *Balong*, Garo.

A large tree (70'/60"—150'/12" Khalasi block, Goalpara). *Bark* greyish brown or dark grey with vertical fissures, .5-1 in. apart, .7-1 in. thick; inside soft, somewhat mucilaginous, pinkish or light-reddish brown with distant broad whitish streaks. *Leaves* 7-12 by 3-5 in., elliptic or oblong or ovate-oblong, bluntly acuminate, rigidly coriaceous, glabrous; lateral nerves 8-12 on either half, prominent beneath; tertiary nerves parallel; base narrowed into the petiole, petiole thick. 1-2 in. long. *Panicles* terminal, 3-7 in. long, minutely rusty pubescent (purplish?). *Flowers* about .1 in. across, minutely pubescent. *Perianth* tube funnel-shaped.

Stamens glabrous. *Fruit* oblong-ellipsoid, 1·5 in. long, black when ripe, fruiting pedicel much thickened.

LAKHIMPUR, SIBSAGAR, GOALPARA, GARO HILLS, CACHAR, N. C. HILLS, K. & J. HILLS.

Wood reddish-brown, coarse grained.

Flrs. 10-1. Fr. 6-7.

2. *Alseodaphne Owdenii* Parker. Vern. *Jatisundi*, *Tilsundi*, Cachar, Sylh.

A large tree (60'/5'); branches pale, glabrous. *Leaves* 3-5 by 1-1·5 in., lanceolate, acute or bluntly acuminate, entire, thinly coriaceous, glabrous, paler glaucous beneath; lateral nerves 4-7 on either half, arcuate, somewhat prominent; base attenuate, petiole ·2-·4 in. long. *Panicles* lax from beneath the crowded leaves. *Perianth* segments ·08 in. long, minutely puberulous, ovate, caducous in fruit. *Filaments* puberulous; of 3rd series with 2 glands close to the base; staminodes (4th series) cordate. *Drupe* ·1-·4 in. long, ellipsoid, green; fruiting pedicel thickened, about ·4 in. long. *Fruits* blue-black when ripe.

CACHAR, J. S. Owden, (U. N. Kanjilal's No. 5694).

Timber of good quality, much valued in Surma Valley.

Flrs. 5. Fr. Rainy season (8-9).

3. *Alseodaphne Keenani* Gamble.

A large tree; branches thick, greenish, somewhat inconspicuous, lenticellate, ultimately minutely rusty-puberulous. *Leaves* 5-10 by 4-5 in., elliptic, shortly acuminate or obtuse, subcoriaceous, glabrous above, glaucescent, minutely rusty-puberulous beneath; lateral nerves 9-11 on either half, prominent beneath, arcuate; base acute; petiole 1·5-2 in. long. *Peduncles* 4-6 in. long, many-branched; cymes 5-6 flowered; pedicels slender, stellately puberulous above, ·08 in. long. *Perianth* segments ovate, stellately puberulous; 3 outer ·6-·08 in. long, 3-nerved; 3 inner ·08-·1 in. long, 5-nerved, caducous in fruit. *Stamens* in 1st and 2nd series oblong; anther glabrous, glandulose-punctate; filaments villous, ·04 in. long; in 3rd series outer anthers rectangular,

glandular punctate; filaments shortly villous, glands subglabrous, close to the base; staminodes (4th series) .02 in. long, sometimes absent. *Ovary* ovoid, glabrous; style slightly oblique; stigma capitate. *Drupe* (immature) ellipsoid, glabrous; fruiting pedicel minutely pubescent.

CACHAR (Goolbelati near Dumcherra). (Kew Bulletin 1914. P. 188).

A. dumicola W. W. Smith.

A shrub (20'-25' tall), branches fulvous-tomentose. *Leaves* 5-8 by 2.5-4 in., obovate or sub-elliptic, rotundate, obtuse or shortly acute, coriaceous; base cuneate or sub-rotundate; lateral nerves 10 on either side, distinct. *Flowers* brownish in rather short panicles, about .3 in. long; peduncles robust, rigid, densely fulvous-tomentose. *Perianth* segments 6, unequal, outside ones .3 in. long, oblong-lanceolate, somewhat fulvous-tomentose on both sides. *Stamens* 9, perfect, about .2 in. long; staminodes (in the 4 in. series) somewhat villose. *Ovary* depressed, globose, about .1 in. across, slightly villose.

Sheveli—Salween divide, Yunnan upto 8,000 feet.

(Notes Royal Botanic Gardens, Edinburgh, Nos. LXIII-LXIV Novr. 1921).

NAGA HILLS, ASSAM 6,000 feet (Bor Nos. 2662 & 5082, Kew Bulletin No. 5, 1938).

"A very large tree; excellent timber."

Flrs. 5. Fr. 7.

7. MACHILUS Nees.

Evergreen trees; leaf buds lanceolate; buds of the inflorescence with imbricate scales. *Leaves* alternate, penninerved. *Flowers* 2-sexual in axillary and pseudo-terminal panicles. *Perianth* tube short or 0; segments 6, sub-equal, of outer smaller, nearly always persistent and spreading or reflexed in fruit. *Perfect* stamens 9; filaments of the first and second series eglandular with introrse anthers; those of the third series 2-glandular and with extrorse anthers; staminodes of the fourth series cordate; all anthers 4-celled. *Ovary* sessile, narrowed into the style. *Berry* globose or oblong. seated on the persistent perianth, which is hardly enlarged; fruiting pedicel not swollen.

Fruit ellipsoid or oblong :—

Perianth segments glabrous or almost so :—

Perianth segments .2-.25 in. long, linear-oblong.

1. *M. odoratissima*.

Perianth segments about .1 in. long, broadly elliptic or ovate.

2. *M. parviflora*.

Fruit globose :—

Perianth segments tomentose or silky :—

Leaves densely tomentose beneath :—

Fruit 1 in. across, seated on the reflexed perianth.

3. *M. villosa*.

Fruit 1.5 in. across, seated on stout pedicel (perianth almost deciduous).

4. *M. edulis*.

Leaves glabrous or finely pubescent :—

Filaments hairy at base only :—

Leaves adpressed, silky beneath :—

Fruit about .25 in. across :—

Lateral nerves 6-8. 5. *M. bombycina*.

Leaves quite glabrous :—

Fruit .3-.4 in. across :—

Lateral nerves 7-12. 6. *M. Gamblei*.

1. *Machilus odoratissima* Nees. Vern. *Dieng la-ngiar-iong*, Kh.

A middle sized tree. *Bark* dark-grey, somewhat rough outside upto .7 in. thick; blaze somewhat granular, soft, light or pinkish brown with scattered lighter coloured tissue, darkening on exposure; twigs glabrous. *Leaves* crowded at the ends of branches, 3-7.5 by 1-2.5 in., very variable in shape, oblanceolate, oblong-lanceolate, elliptic-oblong or -obovate, shortly acuminate or acute; glabrous, dark green and shining above, paler and slightly glaucous beneath; base cuneate, acute or obtusely narrowed; main lateral nerves slender, usually 7-13 on either side; nervules prominent in dry leaves with minute impressed spaces between; petioles .3-.7 in. long, channelled. *Panicles* subterminal, upto 5 in. long, peduncled, glabrous. *Flowers* yellowish-green, scented. *Perianth* tube obsolete; segments .2-.25 in. long, narrow-oblong; outer slightly smaller, glabrous or puberulous outside, more or less villous within, at least towards the base. *Filaments* hairy near the base or glabrous. *Fruit* .5-.7 in. long, oblong or ellipsoid, purple and primrose when ripe.

KHASI HILLS ascending upto 6,000 ft., distribution doubtful in the plains. Some sheets from Sylhet (Nos. 6895, 4916) and Sibsagar (No. 3558) have been referred to this species, but I am inclined to regard them as being more nearly allied to *M. bombycina*. They have the glabrous inflorescence of this species. The flowers are rather small and the perianth segments are silky outside but less so than in typical *M. bombycina*, and the undersurface of mature leaves are minutely silky. There are no fruits. It appears that the Sylhet sheets represent a less hairy form of *M. bombycina*.

Flrs. 3-4. Fr. 5-6.

2. *Machilus parviflora* Meissn. Vern. *Dieng-rang*, *La-niar-iong*, *Dieng-kanyar*, *Dieng-niar-um*, Kh.; *Dieng-satler*, Synt.; *Teu-ma-ching*, Naga.

A small tree. *Bark* grey or pale-brown, rough outside; blaze light-brown, viscid, green near the outer dead layers. *Leaves* variable, 3-8 by $\cdot 7\text{--}2\cdot 75$ in., narrowly oblong, oblong-lanceolate or oblanceolate, obtuse, subacute or obtusely acuminate, glaucous beneath; main lateral nerves 8-12 on either half; nervules minutely reticulating on both surfaces (at least in dry specimen); petiole $\cdot 5\text{--}\cdot 75$ in. long. *Panicles* terminal and from upper leaf axils, long-peduncled, lax, few-flowered, at first thinly pubescent, glabrescent with age, 1-5 \cdot 5 in. long. *Flowers* greenish yellow, about $\cdot 1$ in. long pedicels about $\cdot 2$ in. long, stout. *Perianth* subglobose, glabrescent with age, obscurely puberulous within; lobes broadly elliptic or ovate, short. *Filaments* nearly glabrous. *Ovary* glabrous. *Fruit* $\cdot 6\text{--}\cdot 75$ in. long, ellipsoid.

KHASI HILLS, 4-5,000 ft.

Flrs. 9. Fr. 2.

3. *Machilus villosa* Hk. f. Vern. *Bondai-sum*, Sum. Ass.; *Jai-khlong*, Mech; *Theng-bu-frok*, Mik.; *Ban-gel*, *Bol-dak-sra*, Garo.

A moderate-sized tree with spreading crown. *Bark* dark-grey to light-brown, rough outside, reddish-brown to whitish with brown specks inside, darkening on exposure, about $\cdot 6$ in. thick; young shoots and inflorescence rusty or grey-tomentose. *Leaves* 3-7 by 1-2 \cdot 5 in., elliptic to lanceolate or oblanceolate, usually acuminate, less often acute or obtuse,

pale and shining above, purplish-brown or brown beneath; lateral nerves 6-8 on either side, strong; petiole .3-1 in. long. *Panicles* upto 6.5 in. long, subterminal, fascicled with spreading subcorymbose branches; peduncles stout; pedicels short, stout. *Flowers* about .2 in. across, densely ferruginous, tomentose outside; lobes broad, usually elliptic or elliptic-lanceolate, obtuse or sub-acute, pubescent within, about .1 in. long, enlarged, reflexed in fruit. *Filaments* glabrous. *Berry* globose, about .1 in. across.

DARRANG, NOWGONG, GOALPARA, GARO HILLS.

The wood makes good fuel.

Flrs. 12-3. Fr. 5.

4. *Machilus edulis* King.

Branchlets thick; leaf scars prominent; shoots and inflorescence silky villous. *Leaves* 3.5-8 by 1.5-3 in., obovate-oblong, or oblanceolate, apiculate, more or less abruptly short-acuminate or obtuse, undersurface pubescent or glabrate, thinly coriaceous; lateral nerves prominent beneath, 10-12 on either side; petiole .5-.75 in. long. *Panicles* pedunculate, 2.5-6 in. long. *Flowers* .25 in. across. *Perianth* lobes oblong or elliptic, more or less hairy on both surfaces. *Filaments* villous. *Fruit* 1.5-2 in. across, on stout, woody peduncles with no trace of perianth.

DAFFLA HILLS, ABOR HILLS, etc.

Flrs. 5. Fr. 2.

5. *Machilus bombycina* King. Vern. *Artucheknan*, Mik.; *Mojili*, Mech; *Som*, Ass.

A middle-sized tree with spreading branches. *Bark* light or dark-grey, rather rough; blaze mucilaginous, reddish- or pinkish-brown; young shoots and inflorescence silky. *Leaves* 2.5-5 by .8-2 in., elliptic-lanceolate to obovate-lanceolate, oblong-lanceolate or oblanceolate, acuminate or sub-acuminate; coriaceous, glabrous above, adpressed silky beneath when young, minutely silky or puberulous with age; base cuneate or acute; lateral nerves 6-8 on either half, slender; petiole .3-.7 in. long. *Panicles* sub-terminal, upto

4·5 in. long, branches spreading; pedicels upto ·35 in. long, silky. *Flowers* about ·25 in. long. *Perianth* tube obsolete; segments oblong or oblong-lanceolate, silky on both surfaces, often more densely outside except towards the base, inside villous with spreading hairs. *Filaments* villous at the base. *Fruit* globose, ·25-·3 in. across.

Throughout the province—natural and cultivated, ascending to an elevation about 1,500 ft. in the KHASI & JAINTIA HILLS.

Muga silk worms are reared on the tree.

Flrs. 12-2. Fr. 3-4.

6. Machilus Gamblei King. Vern. *Mojli*, Ass.; *Ong-that*, Garo.

A medium-sized to often a large tree in our area. *Bark* greyish brown or dark grey, buttressed at the base, warty, often with horizontal wrinkles and rough; outside light reddish-brown or nearly white with streaks of darker tissue; inside upto ·75 in. thick; young parts silky-pubescent. *Leaves* 2·5-6 by ·7-2·2 in., variable, obovate-oblong, oblanceolate or lanceolate to elliptic, acuminate, thinly coriaceous, glabrous or nearly so, glaucous and pale beneath, gradually narrowed to a cuneate or acute base; main lateral nerves 7-12 on either half; petiole ·3-1 in. long, slender, glabrous or pubescent. *Flowers* yellowish-green, about ·25 in. long, in lax few-flowered, pubescent panicles, 1-4 in. long, from the bases of the new shoots or upper portions of old ones; pedicels about ·25 in. long. *Perianth-tube* divided nearly to the base; lobes oblong or narrowly oblong-lanceolate, silky pubescent on both surfaces, more densely within. *Filaments* slightly hairy at the base. *Fruit* ·3-·4 in. across, globose, black and primrose when ripe.

N. E. FRONTIER, SIBSAGAR, Jorhat, KHASI HILLS, 3-4,000 ft. Mann! GOALPARA, GARO HILLS.

Flrs. 1-4. Fr. 6-7.

Machilus khasyana Meissn. Vern. *Dieng-la-tam-sreng*, Kh.

A moderate-sized tree with spreading branches; young parts and inflorescence brown pubescent or tomentose. *Bark* dark-brown and rather rough outside; blaze nearly white to reddish inside. *Leaves*

crowded at the ends of branches, 5-10 by 1·25-3 in., oblanceolate to elliptic or obovate, usually shortly acuminate, sometimes sub-obtuse, glaucous beneath; main lateral nerves strong, arched, 10-14 on either side; nervules prominently reticulate on both surfaces; petiole 5-1·5 in. long. *Panicles* upto 5 in. long, peduncled from upper leaf axils; buds subglobose, tomentose. *Perianth* 15 in. across; lobes broadly ovate or elliptic-ovate. *Filaments* very short. *Ovary* glabrous. *Fruit* not seen.

KHASI HILLS, 4,500-5,200 ft. Sheets Nos. 5977 (Nongstom) and 6417 (Shaith-sa-thiyat) have been referred to this species at the Calcutta Herbarium.

Flrs. 9.

***Machilus Kingii* Hk. f.**

A small tree. *Bark* grey warty and slightly reticulately fissured; blaze white with brown strands, green at the edges; scales of leaf buds rounded, silky outside. *Leaves* 6-10 in. long, elliptic-lanceolate or oblanceolate, coriaceous, glaucous beneath; lateral nerves 8-10 on either side, slender; petiole 5-1 in. long. *Panicle* slender, sparsely puberulous. *Flowers* 3 in. across; lobes adpressed-pubescent on both surfaces. *Filaments* nearly glabrous.

Our sheet No. 6459 from KHASI HILLS, Sutnga has been referred to this species at Calcutta, but the determination is not satisfactory in view of the incomplete material.

***Machilus sericea* Bl.**

A middle-sized tree. *Bark* dark brown, rough and fissured, about 5 in. thick; blaze coarsely granular, brown, aromatic; branchlets stout; young parts and inflorescence silky tomentose. *Leaves* 4-8 by 8-1·7 in., rather variable, oblong to lanceolate, acuminate, acute or obtuse; base narrowed, glabrescent above, glaucous beneath with age, coriaceous, finely reticulate on both surfaces; lateral nerves slender, 12-15 on either side; petiole 7-1·5 in. long. *Panicles* long-peduncled with short branches, 4-8 in. long; pedicels short. *Flowers* about 15-2 in. across, hairy on both surfaces. *Filaments* short, hairy. *Fruit* not seen.

GARO HILLS.

Probably little more than a silky form of *M. odoratissima*.

Flrs. 3.

***Machilus globosa* A. Das. Nov. Sp. Vern. Kaunla, Ass.**

A tall tree. *Bark* smooth, greyish; young parts glabrous; bud-scales sericeous. *Leaves* 2-6 by 5-2 in., lanceolate, oblong-lanceolate or elliptic-lanceolate, bluntly acuminate, coriaceous, glabrous, glabrescent beneath, slightly hairy along the nerves; midrib impressed above, pro-

minent beneath; lateral nerves indistinct, about 7-12 on either half; base cuneate; petiole .3-.7 in. long. *Flowers* in peduncled cymes, glabrous, arranged in panicles in the axils of terminal leaves, branches divergent; pedicels .1-.2 in. long, elongating, about 4 in. in fruit. *Perianth* lobes 6, sub-equal, reflexed, 3-7 nerved, slightly accrescent in fruit; outer slightly smaller and narrower, oblong, acute, thinly pubescent, puberulous or glabrescent outside, glabrous inside (but very sparsely pubescent towards the base), .15-.18 by .05 in.; inner lobes .2-.25 by .07 in., more acute, oblong to lanceolate, pubescent on both sides, more so inside, with large hairs. *Stamens* I & II series equal; filaments almost glabrous with spreading silky hairs at the base, .07-.5 in. long; III series slightly larger, biglandular at the base; glands oblong-ovate, stipitate; stipes silky hairy; staminodes (IV series) with spreading silky hairs at the base, stalked, hastate. *Ovary* globose, glabrous, slightly stipitate; style subulate, .05 in. long; stigma discoid. *Fruit* globose, .4 in. in diameter, glabrous, seated on the persistent base of the perianth.

Type Sheet No. 10640, (Shillong Forest Herbarium, A. Das); NOWGONG (Diphu); DARRANG.

It is a large tree. The timber is extensively used as "Bonsum" but is not so much durable and the quality is much inferior.

Flrs. 4-5. Fr. 7-8.

Machilus Listeri King.

A tall tree. *Leaves* 2.5-3.5 by 1.3-2.5 in., elliptic-oblong, oblanceolate, obovate, oblong-acute or abruptly blunt-acuminate, entire, coriaceous, glabrous, glaucous beneath; lateral nerves 8-12 on either side, sub-parallel, slender, prominent beneath; base cuneate or narrowed into the petiole; petiole .5-.8 in. long, channelled above. *Fruit* globose, .8-1 in. across.

NORTH LAKHIMPUR (Narainpur), Duking Valley (3,000 ft.)
(Lister No. 241.)

Machilus dubia Das and Kanjilal. Nov. Sp.

A tall tree; branchlets blackish. *Leaves* 4-5 by 2.2-5 in., elliptic or elliptic-ovate, entire, bluntly acute, coriaceous, glabrous; lateral nerves 8-10 on either half; base acute; petiole .8 in. long. *Inflorescence* terminal panicle. *Perianth* segments sub-equal, .04-.06 in. long; inner series slightly longer, .15-.2 in. long, oblong-lanceolate to ovate-oblong, sub-acute, pubescent outside; outer series glabrescent or puberulous inside with age; inner series persistently pubescent. *Stamens* of series III largest; filaments .07-.12 in., sparsely pubescent at the base outside, more or less glabrous on the inner surface; glands of III series stipitate, cordate or auriculate at the base; apex rounded; stipes pubescent; staminodes bluntly cordate or hastate, stalked; stalks villous outside

with spreading hairs. *Ovary* glabrous; style subulate; apical portion early deciduous.

Type Sheet No. 10778 (Shillong Forest Herbarium) SIBSAGAR.

Flrs. 9.

It could not be matched in India. It appears to be a new species of *Machilus* near *Machilus rimosa* Bl. In the absence of fruiting specimen it could not be definitely described as a new species.

The timber is sold as a second class "Bonsum." In appearance also the timber resembles true "Bonsum" to a great extent.

8. PHŒBE Nees.

Shrubs or trees, evergreen. *Leaves* alternate, often crowded at the ends of the branchlets, penni-nerved. *Flowers* hermaphrodite or polygamous in axillary or subterminal peduncled panicles; perianth tube short; segments 6, subequal, erect, accrescent in fruit and clasping the base. *Stamens* 9, perfect, I and II series introrse, eglandular; filaments slender; III series extrorse with 2 large stipitate glands at the base; staminodes of 4th series cordate or sagittate, stipitate; anthers 4-celled. *Ovary* usually globose; stigma discoid. *Fruit* hairy, ovoid-ellipsoid or globose; seated on the hardened accrescent perianth segments; testa thin; cotyledons fleshy.

Fruiting perianth segments adpressed, rigid :—

Perianth glabrous :—

Leaves glabrous, lanceolate, .8-2 in. broad. 1. *P. lanceolata*.

Leaves glabrous, linear-lanceolate, .3-.4 in. broad. 2. *P. angustifolia*.

Perianth silky or pubescent :—

Lateral nerves 8-12 :—

Leaves puberulous or glabrous beneath; young shoots minutely puberulous. .. 3. *P. pallida*.

Leaves pubescent beneath; young shoots ferruginous-tomentose. .. 4. *P. paniculata*.

Lateral nerves 15-20; under side of pedicels rusty-tomentose with long soft hairs; young shoots rusty-tomentose. Fruit ellipsoid, .5 in. long. 5. *P. attenuata*.

Fruiting perianth segments coriaceous :—

Perianth softly tomentose in flowers :—

Lateral nerves 10-12; fruit .6-.9 in. long; perianth puberulous outside, minutely villous inside the base. 6. *P. goalparensis*.

Perianth grey tomentose outside, glabrous
inside :—

lateral nerves 10-14, fruit .1-.17 in. long. . . 7. *P. Cooperiana*.

1. *Phœbe lanceolata* Nees. Vern. *Moso-sigar-bap-hang*, Kach.; *Chang-check*, Duff.; *Thang-han-jan*, Mik.; *Deing-jalong*, Kh.

A small or middle-sized tree. *Bark* greyish, fairly smooth, (with very shallow fissures) exfoliating in pieces, about .3 in. thick; inside light-brown, somewhat fibrous, darker, (bark smells like cinnamon). *Leaves* 3.5-8 by 1.2-3 in., lanceolate, oblong-lanceolate or elliptic-lanceolate, long-acuminate, thinly coriaceous, glabrous (pubescent beneath when young), glaucous beneath; lateral nerves 6-10 on either half, ascending; base cuneate; petiole .2-.9 in. long. *Flowers* yellowish green, in lax, long-peduncled, corymbiform panicles usually clustered laterally at the base of new shoots; bracts silky, pubescent, deciduous, upto .5 in. long; bracteoles minute. *Perianth* glabrous, .1 in. long, cup-shaped; segments ovate or elliptic, sub-acute or obtuse, enlarging in fruit, glabrous outside, pubescent within. *Inner* stamens hairy. *Staminodes* of 4th series villous, stipitate, cordate. *Ovary* glabrous; style slender. *Berry* black, ovoid or ellipsoidal, .3-.5 in. long.

Fairly common in KAMRUP, SIBSAGAR, NOWGONG, DARRANG, N. C. HILLS, GOALPARA, NAGA HILLS, KHASI & JAINTIA HILLS, (upto 5,000 ft.).

Leaves used for cattle and buffalo fodder. Ash of the berries is said to cure sores.

Flrs. 4-5. Fr. 10-11.

2. *Phœbe angustifolia* Meissn.

A shrub or small tree. *Leaves* pale green, 2-7 by .3-.7 in., narrow-lanceolate, caudate-acuminate, coriaceous, glabrous; lateral nerves 7-11 on either half, very slender, arcuate; base cuneate or narrowed into the petiole .3-.7 in. long. *Flowers* greenish, corymbiform at the ends of long peduncled panicles. *Perianth* glabrous; segments .12 in. long. *Fruit* ellipsoidal, .3-.4 in. long, glabrous, smooth.

GARO HILLS, KHASI & JAINTIA HILLS. (2,500-4,000 ft.).

3. *Phœbe pallida* Nees.

A small or middle sized tree; young parts pubescent. *Bark* reddish-brown. *Leaves* 3-8 by .9-1.5 in., oblanceolate or elliptic, lanceolate, acuminate, minutely pubescent when young, glabrous when mature, shining green above, glaucescent beneath; lateral nerves 6-9 on either half; base acute or cuneate; petiole .2-.6 in. long, channelled above. *Flowers* .2 in. across, greenish yellow, in lax puberulous peduncled panicles upto 5 in. long round the side of the new shoots (not clustered). *Perianth* .1 in. long; segments ovate, pubescent without and within, enlarged in fruit. *Stamens* shorter than the perianth, glandulose; staminodes hirsute, sagittately cordate, acute. *Ovary* obovate; style filiform, glabrous; stigma trigonous. *Fruit* .4-.5 in. long, ellipsoidal.

KHASI HILLS.

Flrs. 6-7. Fr. Cold season.

4. *Phœbe paniculata* Nees. Vern. *Mekahi*, Ass..

A tall tree; young shoots rusty-tomentose. *Bark* dark-grey, reticulately fissured, about .8 in. thick, fibrous, at first cream coloured, turning brown. *Leaves* crowded at ends of twigs, 3-8.5 by 1-8.5 in., elliptic, oblanceolate, (oblong-obovate or oblong-elliptic *Khasi Hills form*) acuminate, coriaceous, pubescent beneath and also sometimes on the midrib above; lateral nerves 6-12 on either half, prominent beneath; base cuneate or narrowed into the petiole .3-.7 in. long. *Panicles* sub-corymbose, pubescent, arising laterally from new shoots; peduncle slender, 3-4 in. long; bracteoles subulate. *Flowers* small, grey or ferruginous-tomentose. *Perianth* segments ovate, laciniate. *Stamens* glandulose; staminodes capitate. *Ovary* subglobose, whitish, shaggy; style filiform, twice longer than the ovary, glabrous or sparsely hairy; stigma small, pale, obscurely dentate. *Fruit* .3-.5 in. long, somewhat quadri linear, ovoid, obtuse, reticulately rugose, blackish; seeds obovate, testa crustaceous.

DARRANG, KHASI HILLS. (Borapani upto 3,000 ft.).

Flrs. 3-5. Frs. 9-11.

5. *Phœbe attenuata* Nees. Vern *Bonsum*, Ass.; *Thai-jing-phang*, Kach.; *Thing-batwang-arong*, Mik.

Sometimes a very large tree (100-112'). *Bark* dark-grey exfoliating in papery flakes; inside greyish-brown, mottled with coarse grains of dark-brown; young parts rusty-tomentose with long soft hairs. *Leaves* crowded at the ends of branchlets, 5-10 by 1·5-3 in., oblong or oblanceolate, entire, coriaceous, ferruginous-tomentose beneath; lateral nerves 15-20 on either half; tertiaries parallel; base cuneate or narrowed into a short petiole ·5 in. long. *Flowers* ·25 in. across, tomentose, in pedunculate spreading panicles; peduncles stout, 3-6 in. long. *Perianth* rigid, campanulate; segments coriaceous, subtomentose. *Stamens* in series III somewhat shorter than the perianth; filaments linear, narrow, longer than the anthers by half; anthers pellucid-punctate; staminodes triangular, sagittate. *Ovary* globose, depressed; style slightly longer, filiform; stigma oblique, tridentate. *Fruit* ·5 in. long, narrowly ellipsoid.

KHASI HILLS (upto 3,000 ft.).

One of the most valuable local timbers known as 'Bonsum.' The quality and the economic uses are the same as that of *P. goalparensis* Hutch.

Flrs. 3-4. Fr. 9-10.

6. *Phœbe goalparensis* Hutch. Vern. *Nikahi*, Mech (Goalpara); *Bonsum*, Ass.

A tall timber tree. *Stem* buttressing at base. *Bark* greenish or blackish-grey, reticulately furrowed; branches ultimately minutely puberulous, blackish; lenticels large, partly sunk. *Leaves* 2·4-6 by 1·2-2 in., obovate or ovate-lanceolate, somewhat shortly or obtusely acuminate, rarely obtuse, rigidly chartaceous, glabrous, puberulous on the nerves beneath; midrib impressed above, prominent beneath; lateral nerves 9-12 on either half, distinctly prominent beneath, tortuous and getting obscure towards the margin; tertiaries rather prominent on both sides and tortuous; base narrowed or acute; petiole ·4-1 in. long, glabrous above, obscurely puberulous beneath. *Inflorescence* in long peduncled lax panicles; pedicels about ·2 in. long, ashy, minutely puberu-

lous; bracteoles minute, caducous. *Flower* buds ovoid, acute, .25-.3 in. long. *Perianth* segments—outer .17 in. by .12 in., ovate, obtuse, coriaceous, puberulous outside, adpressed, villous inside towards the base; inner slightly longer, equipped with few inflexed hairs towards the apex on the inner side. *Stamens* slender; filaments pubescent in I and II series, .17 in. long; anthers oblong-ovoid, obtuse, .06 in. long, in III series somewhat larger, 2-glandular towards the base; glands cordate. *Staminodes* in IV series sagittate, shorter than the stamens (about half)). *Ovary* depressed, globose, pubescent; style about .04 in. long. *Fruit* ellipsoid, blackish, about .6-.9 in. long, glabrous.

GOALPARA, Type Sheet No. 5092 (U. N. Kanjilal). DARRANG, NOWGONG, SIBSAGAR. Commonly mistaken as *Phæbe Hainesiana* Brandis.

Flrs. 2-4. Fr. 6-8.

One of the most valuable timbers of Assam. Commercially known as "Bonsum" or "Assam teak" used for building structure, planking and furniture and all kinds of cabinet work in the Province.

It appears from the examination of the sheets of *Phæbe goalparensis* Hutchinson collected from different districts that there are slight local variations in inflorescence, leaves and fruits from the type (U. N. Kanjilal's Sheet No. 5092) described by Hutchinson. These local variations, however, cannot be considered sufficiently distinguishing characters for further division into varieties or forms except the following two distinct varieties noticeable in the area where the type occurs. They are very characteristic even with the naked eye and I have described them as new varieties. Their points of difference are enumerated below :—

***P. goalparensis* Hutch. Var. *Martiniana* Das.**

Leaves almost similar to type, sometimes narrower. *Inflorescence* very much denser and congested, not at all lax; buds clavate, small and obtuse. *Perianth* segments unequal; outer series smaller in length, villous on both surfaces; ovary broader than long, villous all over.

***P. goalparensis* Hutch. Var. *Boriana* Das.**

Leaves obovate or elliptic-ovate, broader; petiole slightly larger. *Inflorescence* very much lax; buds ovoid. *Perianth* segments ovate-lanceolate, blunt, very much thicker, accrescent in fruit. *Ovary* globular, thinly pilose at top. *Fruit* slightly bigger.

This variety approaches *P. Hainesiana* Brandis more or less.

The above-mentioned varieties are under further investigation. The timber cannot be at all technologically differentiated from the type and there is no difference in the commercial value of the timber of these varieties with that of *P. goalparensis* Hutch. *P. Hainsiana* Brandis has been recently recorded from Naga Hills.

7. *Phœbe Cooperiana* U. N. Kanjilal ex A. Das. Nov. sp. Vern. *Mekahi* N. E. F. Tract.

A large timber tree (120'/14') ; bark greyish, exfoliating in flakes, shallowly and reticulately furrowed. *Branches* sparsely lenticellate; young shoots rusty-villous, ultimately puberulous. *Leaves* 5-11 by 2-4 in., alternate, obovate, oblong-lanceolate or obovate-oblong, entire, shortly or abruptly acuminate, rarely obtuse or actute, chartaceous, glabrous above, puberulous beneath, more so along the nerves and midrib; midrib impressed above, prominent beneath; lateral nerves 10-14 on either half, sub-parallel, curved towards the margin of the blade; tertiaries prominent beneath; base narrowed or cuneate; petiole 1-5·5 in. long, puberulous. *Inflorescence* puberulous, in long-peduncled panicles, crowded at the ends of branchlets; bracteoles obscure. *Buds* ovoid-obtuse, .15-.3 in. long; pedicels .1-.25 in. long, adpressed, silky villous. *Perianth* segments sub-equal, coriaceous, oblong, sub-acute, grey, tomentose outside, glabrescent with age inside, .2-.25 in. long; the inner .26-.3 in.; outer slightly broader, ovate to elliptic. *Stamens*-filaments .1-.12 in., villous; anthers oblong, ovoid, .05-.06 in. long; in the III series filaments broadened at the base, biglandular; glands irregularly stipitate; in the IV series staminodes villous, bluntly sagittate at the tip, narrowed towards the base, about .07 in. long. *Ovary* glabrous; *style* subulate, about .1 in. long. *Fruit* 1-1·5 in. long, ellipsoid, blackish, glabrous.

NORTH EAST FRONTIER TRACT (Kherim, Morkong-Sellek, Pasighat); DARRANG.

Type Sheet No. 7722 (H. L. Cooper, 1922). Fr. (A. Das 10634, 1934, Shillong Forest Herbarium).

Blaze reddish. Timber is very valuable in the N. E. F. Tract. Similar in structure to that of *Bonsum* (*Phœbe goalparensis* Hutch), used for building works, planking, doors, etc., and also for furniture.

Flrs. 4-5. Fr. 7-8.

9. ACTINODAPHNE Nees.

Evergreen trees or shrubs. *Leaves* sub-verticillate, rarely opposite or scattered, penni- or triple-nerved, usually coriaceous. *Flowers* diœcious in bracteate umbels, clusters or racemes; bracts caducous, imbricate. *Perianth-tube* short; segments 6, sub-equal. *Male flowers* :—stamens 9; filaments slender, glandular in 3rd series only; anthers introrse, 4-celled. *Pistillode* absent or present. *Female flowers* :—staminodes 9, linear or spatulate in 1st or 2nd row, biglandular in 3rd row. *Ovary* usually glabrous, ovoid, attenuate into the style; stigma dilated. *Fruit* seated on the enlarged hardened flat or concave perianth tube; testa thin; cotyledons thick, usually hemispheric.

Leaves penni-nerved, more or less verticillate :—

Leaves 4-10 in. long, coriaceous, glaucous beneath :—

Fruit globose, .3 in. across. 1. *A. angustifolia*.

Leaves 3-6 in. long, coriaceous, pubescent beneath (not glaucous) :—

Fruit broadly ellipsoid, .5 in. long; pedicels longer than fruit. 2. *A. reticulata*.

Leaves membranous, 3-6 in. long, glabrous (not glaucous) :—

Fruit oblong, about .6 in. long, in sessile or sub-sessile clusters. 3. *A. sikkimensis*.

Leaves almost triple-nerved, sub-verticillate, some leaves 10-18 in. long :—

Branchlets, leaf buds and leaves rusty-pubescent :—

Fruit ellipsoid, .6-1 in. long. 4. *A. obovata*.

1. *Actinodaphne angustifolia* Nees. Vern. *Talakung*, Tipp.; *Lobong-kron*, Mik.; *Nabhar*, Kuki; *Petarichawa*, Ass.; *Dhupati*, Mech, *Lotron*, Nowgong; *Mechchhim-ching*, Naga.

A large or moderate-sized tree. *Bark* greyish with white patches, about .3 in. thick; inside brownish, somewhat granular, faintly mottled; blaze yellowish, turning brown; young parts rusty-tomentose. *Leaves* 4-10 by 1.5-2.5 in., oblanceolate, lanceolate or elliptic, bluntly acuminate or attenuate, coriaceous, shining above, rather glaucous beneath; lateral nerves 6-10 on either half, slender, oblique,

prominent beneath; petiole .3-.7 in. long. *Flowers* in shortly peduncled, umbellate, tomentose clusters. *Fruit* globose, .3 in. across (in bundles), seated on a small cup-shaped entire perianth tube.

Fairly common.

Wood cream coloured.

Flrs. 9. Fr. 12.

2. *Actinodaphne reticulata* Meissn.

A small tree; bark brown; young parts minutely pubescent. *Leaves* 3-5 by .8-1 in., elliptic-lanceolate or narrow-lanceolate, acuminate, thinly coriaceous, shining above, very finely pubescent beneath; lateral nerves 10-12 on either half; reticulated veins, conspicuous on both surfaces; base cuneate or acute; petiole .15-.6 in. long. *Flowers* clustered; bud-scales nearly glabrous. *Fruit* broadly ellipsoid, .5 in. long, black, seated on the entire cupular perianth tube; fruiting pedicel about .75 in., cup about .3 in. across.

Mawsmat, KHASI HILLS (4-5,000 ft.).

Flrs. 6. Fr. 10-11.

3. *Actinodaphne sikkimensis* Meissn.

A tree; branchlets slender. *Leaves* 3-6 by .6-1.2 in., lanceolate or linear-lanceolate, caudate-acuminate, membranous, glabrous, green and shining above, glaucous beneath; lateral nerves 10-12 on either half, very slender; base acute or cuneate; petiole .2-.4 in. long. *Female* flowers densely clustered, pedicelled or sub-sessile; bracts 2-4 to each flower. *Style* glabrous. *Fruit* oblong, .6 in. long, seated on the very small, quite entire base of the perianth.

MANIPUR (5,000 ft.). (Watt's No. 5904).

Flrs. 1. Fr. 5.

4. *Actinodaphne obovata* Blume. Vern. *Tala*, Tipp.; *Pati-honda*, *Petarichowa*, *Pajihuta*, Ass.; *Banji*, Mech; *Dieng-*

la-sata, *Dieng-sala-bung-kron*, Kh.; *Diend-lakrao*, Synt.; *Bolring-ranjak*, Garo.

A large or middle-sized handsome tree. *Bark* greyish-brown, exfoliating in thin papery flakes, about .2 in. thick; young parts rusty-pubescent. *Leaves* 7-18 by 2.5-6 in., obovate or elliptic-oblong, acute or obtuse, thinly coriaceous, shining above, rather bluish-white beneath; almost 3-ribbed at the base (or slightly above the base); lateral nerves 4-6 on either half, prominent beneath (including base); base rounded or obtuse; petiole 1.2-5 in. long. *Male* flowers .5 in. across, in clusters. *Perianth* tube short; segments membranous. *Female* flowers smaller in paniced racemes; pedicel about .5 in. long in fruit, stout. *Style* glabrous. *Fruit* ellipsoid, .6-1 in. long, seated on the entire cupular perianth tube; cup dilated, .3-.6 in. across.

LAKHIMPUR, SIBSAGAR, KAMRUP, SYLHET, NAGA HILLS, MANIPUR, GARO HILLS & KHASI HILLS.

Flrs. 3. Fr. 7.

Var. *Wattii* King. Leaves very large 18.5 by 8 in., pubescent on the nerves beneath. *Inflorescence* purplish-brown, silky.

MANIPUR (5,000 ft.). (Watt's No. 6331).

Flrs. 4.

10. LITSÆA Lamk.

Trees, rarely shrubs, usually evergreen, rarely deciduous. *Leaves* as a rule alternate, rarely opposite or sub-opposite, penni-nerved, leaf-buds naked or scaly. *Flowers* diœcious in umbellules of 4-6, rarely more flowered; umbellules sessile or peduncled in clusters or racemes, rarely solitary; involucre bracts 4-6 in., rarely more, concave. *Male* flowers-perianth tube obsolete or very small. *Stamens* normally 9-12; filaments of I & II series eglandular, that of III & IV series if present 2-glandular; anthers generally introrse, 4-celled. *Ovary* 0 or rudimentary. *Female* flowers-perianth tube ovoid or campanulate; segments normally 6, equal or unequal. *Staminodes* arranged like male flowers, outer rows linear or clavate, inner rows subulate, 2-glandular. *Ovary* enclosed in the perianth tube or free; style thick, often armed; stigma

irregularly lobed. *Berry* globose, ovoid, ellipsoid or oblong, seated on the unaltered perianth or on the enlarged perianth tube, with more or less thickened and lengthened pedicel; pericarp usually succulent.

Leaves deciduous, penni-nerved :—

Perianth not enlarged in fruit; segments 6.

Leaf buds naked :—

Peduncles slender; filaments usually hairy; petiole .5-.9 in. long. 1. *L. citrata*.

Peduncles stout; filaments glabrous; petiole .3-.4 in. long. 2. *L. Kingii*.

Leaf buds and peduncles golden brown; filaments hairy; young parts with long silky hairs; petiole .3-.5 in. long. 3. *L. sericea*.

Leaves persistent, penni-nerved :—

Perianth segments obsolete or incomplete, tube scarcely enlarged in fruit.

Leaves coriaceous; umbellules in corymbs or racemes; petiole .6-1.8 in. 4. *L. sebifera*.

Leaves membranous; umbellules solitary; petiole .5-1.5 in. 5. *L. membranifolia*.

Perianth segments 6, tube scarcely enlarged in fruit :—

Leaves rusty, alternate, pubescent beneath. 6. *L. polyantha*.

Leaves glabrous beneath or nearly so :—

Leaves opposite or sub-opposite (some-time alternate) :—

Stamens about 6; lateral nerves 6-8 on either half; petiole .2-.4 in. long. 7. *L. lancifolia*.

Stamens 9; lateral nerves 12-16 on either half; petiole .5-.8 in. long. 8. *L. mishmiensis*.

Stamens 9; filaments villous; lateral nerves 5-7 on either half; petiole .1-.3 in. long. 9. *L. assamica*.

Perianth segments usually 6, tube much enlarged in fruit, umbellules solitary or in clusters :—

Leaves pubescent or tomentose beneath :—

Berry about 1 in. across, umbellules 6-8 flowered; enlarged perianth tube fleshy, turbinate. 10. *L. knasyana*.

Berry about .7 in. across, umbellules 6- flowered; enlarged perianth tube cup-shaped, entire. 11. *L. semecarpifolia*.

Berry about 3 in. across, umbellules
4-5-flowered; enlarged perianth tube
spreading, more or less lobed. .. 12. *L. elongata*.

Leaves glabrous beneath or nearly so :—

Fruit ellipsoid or almost so :—

Filaments densely pilose; fruit 3 in.
long :—

Leaves upto 2 in. broad; petiole
·3-·5 in. long. 13. *L. salicifolia*.

Filaments spreading, hairy; fruit
·4-·5 in. long :—

Leaves not more than ·5 in. broad;
petiole ·2-·3 in. long. 14. *L. angustifolia*.

Fruit oblong or oblong-ovoid :—

Leaves upto 10 in. long :—

Bracts glabrous; male heads
corymbs; lateral nerves 8-11. .. 15. *L. oblonga*.

Bracts tomentose; male head
fascicled; lateral nerves 6-9. .. 16. *L. læta*.

Leaves not more than 6 in. long :—

Bracts silky long; heads 4-
flowered; lateral nerves 7-10
pairs. 17. *L. meisneri*.

Fruit globose, depressed :—

Leaves 5-10 by 2-3 in.; lateral
nerves 6-13 pairs; male heads
corymbosely racemed. 18. *L. Thomsonii*.

Fruit ellipsoid :—

Heads in axillary racemes :—

Male racemes 2-4 in. long;
heads 4-5-flowered; leaves thinly
coriaceous. 19. *L. nitida*.

Male racemes 5-7 in. long, droop-
ing, fruit globose; heads 6-
flowered; leaves finely coriaceous. 20. *L. Panamonja*.

Leaves persistent, sub-triplinerved :—

Heads in sessile (or almost sessile)
cluster :—

Perianth turbinate; segments 4, deciduous,
tube not enlarged in fruit :—

Stamens 6, the 2 inner 2-glandular :—

Fruit oblong-ovoid :—

Leaves 5-12 in. long :—

Leaves rigidly coriaceous, crowded
at the ends of branchlets :—

Young shoots silky :—

Fruit ·5-·6 in. 21. *L. lanuginosa*.

Leaves thinly coriaceous, glaucous beneath with a white bloom :—

Young shoots minutely silky :—

Fruit .4-.5 in. long. .. 22. *L. umbrosa*.

Fruit globose :—

Leaves 1.5-3 in. long :—

Leaves coriaceous, scattered (alternate).

Young shoots silky-pubescent :—

Fruit .08 in. across. .. 23. *L. Mannii*.

1. *Litsæa citrata* Bl. Vern. *Mejankeri*, *Mejankari*, Ass.; *Dieng-si-ing*, Kh.; *Jay-kholong*, Mech.; *Zeng-jil* or *Zeng-jir*, Garo.

A small tree, deciduous, aromatic. *Bark* green, warty, thin; blaze yellowish, turning brownish (young stem green but discs quite black) somewhat mucilaginous; young shoots silky; leaf buds naked. *Leaves* somewhat inequilateral, 3-6 by .8-1.6 in., lanceolate or narrow ovate-lanceolate, caudate-acuminate, membranous, bright green above, glaucous beneath; lateral nerves 8-13, slender, arcuate; midrib often purplish below; base somewhat oblique-acute; petiole slender, .5-.9 in. long. *Flowers* in capitate umbels solitary or in corymbs; bracts 4, ovate, membranous, glabrous, ciliate at the edges; peduncles slender, about .5 in. long; pedicels villous. *Sepals* membranous, obovate, sub-equal. *Fruit* .25-.3 in. across.

Fairly common throughout the Province, (upto 5,500 ft.), also MANIPUR and NAGA HILLS.

Often gregarious on abandoned fire lines or jhummed area. Wood white. *Pat* silk worms (Assam silk) are reared on the leaves of this tree.

Flrs. 11-2. Fr. 6-7.

2. *Litsæa Kingii* Hk. f.

A deciduous shrub, aromatic; branches stout, allied to *Litsæa citrata*. *Leaves* 3-5 by .8-1.5 in., elliptic-lanceolate, acute or shortly acuminate, thinly coriaceous, glaucous beneath; base acute; petiole .3-.4 in. long. *Peduncles* stout; umbellules solitary or few and corymbs 5-flowered. *Perianth*

segments 6, unequal. *Stamens* 8-12; *filaments* globose. *Stigma* discoid. *Fruit* globose, .25 in. across.

KHASI HILLS, Griffith. (F.B.I., page 156, Vol. V).

It appears from the herbarium sheets at Sibpur that the sheets were originally identified as *Litsæa citrata*. The points of distinction merge in intermediate forms. No specimen in Forest Herbarium, Shillong.

Flrs. 3-7. Fr. 9-12.

3. *Litsæa sericea* Wall.

A middle-sized deciduous tree, aromatic; young parts silky hairy; branches stout, blackish; leaf-buds punctate. *Litsæa citrata*. *Leaves* 3-5 by .8-1.5 in., elliptic-lanceolate, late, acute or acuminate, sub-coriaceous, clothed with brown-silky tomentum, specially when young; lateral nerves 8-12 on either half; base acute; petioles .3-.5 in. long, tomentose. *Flowers* .16 in. across (before leaves) in umbel; peduncles golden-brown, tomentose; bracts glabrous. *Perianth* segments rounded, hairy at the base within. *Stamens* 12; *filaments* hairy. *Ovary* ovoid; style short; stigma large. *Fruit* sub-globose, .2 in. across, seated on the small flat perianth tube, fruiting pedicel rather stout, about .8 in. long.

MANIPUR (Watt No. 6,474, 6,518) 8,000-9,000 ft.

Flrs. 4. Fr. 10.

4. *Litsæa sebifera* Pers. Vern. *Heluka*, *Bagnala*, Ass.; *Muka-song-arong*, *Chengnan-arong*, Mik.; *Porsan*, Kuki; *Dieng-ja-lowan*, Kh.; *Baturi*, Nowgong.

A middle-sized evergreen tree; young parts grey, tomentose or pubescent; branches lenticellate. *Bark* greyish brown, rough, warty; blaze, yellowish, mottled-brown, turning black, mucilaginous. *Leaves* variable, 3-8 by 1-4 in., elliptic-oblong or ovate-lanceolate, acute, obtuse or shortly acuminate, entire, coriaceous or pubescent along the midrib, glabrescent above, sparsely pubescent or glabrous beneath; lateral nerves 8-13 on either half; base narrowed; petiole .6-1.8 in. long, tomentose. *Flowers* yellowish, about 2 in. across, in 8-12 flowered umbellules arranged in pedunculate lax corymbs;

pedicels .1-.2 in. long; bracts 4-6, concave, rounded, tomentose, stalked. *Perianth* irregular, often obsolete. *Stamens* 9-20; filaments villous. *Fruit* .25-.4 in. across, supported by the thickened club-shaped pedicel.

KHASI HILLS, ASSAM.

Part of the bark is valued medicinally as an emollient for boils, bruises and wounds. Infusion of the bark is used for dysentery.

Wood greyish-brown, hard, close grained, durable and is not attacked by insects; weight about 46 lbs. per c. ft.

Flrs. 4-7. Fr. Cold season.

5. *Litsæa membranifolia* Hk. f.

A middle-sized tree. *Bark* of branches reddish-brown; branches stout; young parts hoary-pubescent. *Leaves* alternate, 8-12 by 4-6 in., oblong-obovate, obtuse or apiculate, membranous, green, rarely glaucous, rather pubescent beneath; lateral nerves 10-14 on either half, slender; base cuneate; petiole .5-1 in. long. *Heads* solitary, large, 1 in. across (opening). *Flowers* and pedicels villous; bracts 4. *Perianth* incomplete; segments unequal. *Filaments* slender, sparsely villous.

UPPER ASSAM, MISHMI HILLS—Griffith (Kew No. 4,310).

(No specimen in Forest Herbarium, Shillong, F.B.I., p. 159, Vol. V).

6. *Litsæa polyantha* Juss. Vern. *Muga-song-bi-phang*, Mech; *Bol-bet*, Garo; *Holia-gach*, Jharua; *Muga* or *Hoanlu*, Ass.; *Muga-song-arong*, Mik.; *Tapit-pirawr-asing*, Miri & Abor; *Kuthmira*, Nep.; *Huoria*, Sylh.; *Punbang*, Kuki; *Haora*, Cach.; *Dieng-ja-lawan*, Synt.; *Dieng-soh-phoh-skei*, *Dieng-soh-tyllap*, Kh.; *Ching-jai*, Naga.

A tree often attaining a large size (60'/6') with spreading crown; young parts rusty-tomentose. *Bark* greyish-brown, somewhat rough, .7-.8 in. thick; inside reddish-brown, outer edge of blaze gradually light with strands of reddish-brown which are closely packed near the outer edges, gradually further and further apart inward. *Leaves* 3-8 by 1.3-4 in., obovate-oblong, oblanceolate or elliptic-oblong,

acute or rounded, coriaceous, dark green and glabrescent above, glaucous and rusty-pubescent beneath; lateral nerves 6-10 on either half, tertiaries scalariform, prominent; base rounded, somewhat oblique; petioles .5-1 in. long, pubescent. *Flowers* greenish yellow, .2 in. across, in pedunculate umbellate heads; peduncles .2-5 in. long; pedicels villous, about .1 in long; bracts 5, concave, orbicular, membranous. *Perianth* segments 5, nearly free. *Stamens* 9-13; filaments villous; glands stipitate. *Fruit* ovoid, .3-4 in. long, blackish when ripe, supported by the persistent perianth and the thickened pedicels.

Common all over the Province.

The bark is used in Indian Medicine. Muga silk worms are reared on the leaves. Wood not durable. (38 lb. per c. ft.).

Flrs. 3-5. Fr. 6-9, (also later).

7. *Litsæa lancifolia* Roxb ex Wall.

A shrub or a small tree, somewhat aromatic; young parts tomentose; stem dark-brown. *Bark* very thin, greenish-brown inside. *Leaves* opposite, sub-opposite or alternate, 3-6 by 1-2 in., narrow, oblong-acuminate, thinly chartaceous, glaucous beneath; midrib finely tomentose; lateral nerves 6-8 on either half, impressed above, prominent beneath; base acute or cunate; petiole .2-4 in. long. *Flowers* white in umbellate clusters .1 in. across; pedicels .15 in. long. *Sepals* villous, unequal. *Stamens* about 6, unequal. *Fruit* subglobose or ellipsoid-oblong, .4-6 in. long, about .5 in. across, apiculate on the small flat perianth tube.

N.-E. F. TRACT, UPPER ASSAM, SYLHET, CACHAR, KHASI HILLS, (upto 3,000 ft.).

Flrs. 2-4. Fr. 4-6.

8. *Litsæa mishmiensis* Hk. f.

A large tree, glabrous; branches smooth, blackish; buds silky-tomentose. *Leaves* 4-6 by 1.5-2 in., oblong-lanceolate, acuminate, thinly coriaceous, glabrous, paler brown beneath; lateral nerves 12-16 on either half, slender; reticulation of nerves irregular and faint; base acute; petiole .5-8 in. long.

Umbels solitary, 10-15-flowered; peduncles .5 in., pubescent; bracts 4-5, concave, coriaceous; pedicels .16-.3 in. long., pubescent. *Perianth* segments pubescent, oblong. *Stamens* 9; filaments glabrous. *Fruit* unknown.

UPPER ASSAM, MISHMI HILLS, (Griffith).

(F.B.I., p. 161 Vol. V). No specimen in Forest Herbarium, Shillong.

9. *Litsæa assamica* Hk. f.

Branches terete. *Leaves* 1.5-3 by .7-1.5 in., elliptic, ovate or sub-orbicular, acute or bluntly acuminate, thinly coriaceous, rather glabrous; lateral nerves 5-7 on either half, slender; base acute; petiole .1-.3 in. long. *Umbels* few and scattered. *Flowers* small; pedicels puberulous, .12-.15 in. long; bracts 4. *Perianth* segments 6. *Stamens* 9; filaments villous at the base. *Fruit* (immature) narrow-ellipsoid, apiculate, about .25 in. long.

ASSAM (Jenkins).

10. *Litsæa khasyana* Meissn. Vern. *Puyo-asing*, Miri & Abor; *Shong-rong-phang*, Kach.; *Bap-kang-tang-arong*, Mik.; *Bol-thegatcha*, Garo; *Dieng-mosu*, Kh.

A small or middle sized tree (often attaining very large size. Bholeli Reserve 100'/72" U. N. Kanjilal); young parts finely pubescent. *Bark* brownish, almost smooth with white patches and faint horizontal wrinkles, about .25 in. thick; inside pale yellow, turning brownish-yellow. *Leaves* 5-10 by 2-3.5 in., oblong, oblong-lanceolate or elliptic-oblong, acute, coriaceous, glabrous above, glaucous, rusty-pubescent, ultimately glabrous beneath; lateral nerves 10-14 on either half, impressed above and quite stout and prominent beneath; base acute; petiole .4-1 in. long. *Flowers* in umbellule heads; heads above .3 in. across; bracts 4; peduncles .2-.4 in. long. *Perianth* segments silky outside, glabrous within; stamens 7-9. *Fruit* depressed, globose, .8-1 in. across, seated on the enlarged fleshy turbinate perianth tube.

N.-E. F. TRACT, LAKHIMPUR, SIBSAGAR, N. C. HILLS, KHASI HILLS, (2,000 ft.).

Flrs. 6-7. Fr. 10-1.

11. *Litsæa semecarpifolia* Wall. Vern. *Bakhali*, Ass.

A small tree; young parts velvety-tomentose. *Bark* darkish-brown; inside light chocolate-brown, very finely fibrous and oblong, acuminate, coriaceous, glabrous above, pubescent and glaucous beneath; lateral nerves 8-12 on either half, strong, prominent below; base acute or cuneate; petiole .4-.6 in. long. *Flowers* umbellate in axillary clusters, often racemose, about 6-flowered; peduncles short, stout; bracts about 4. *Male flowers* .25 in. across; perianth segments unequal, linear-oblong, pubescent; stamens about 8, pubescent; pistillode 0 or present. *Female* flowers smaller; perianth tube funnel-shaped. *Fruit* depressed, globose, about .7 in. across, seated on the broad cup-shaped perianth tube.

DARRANG, GARO HILLS, MANIPUR, (4,200 ft.).

Flrs. 1-2. Fr. 3-6.

12. *Litsæa elongata* Wall. Vern. *Petari-chawa*, Ass.; *Dieng-ja-long-ngap*, Kh.

A small or moderate sized tree (50'/30''); young parts rusty-tomentose. *Bark* greyish or darkish brown, smooth, .3 in. thick; inside light brown or somewhat pinkish mottled-brown. *Leaves* almost whorled, 5-10 by 1.5-2 in., elliptic-lanceolate, obovate or oblanceolate, acute or acuminate, coriaceous, shining above, pubescent when young, ultimately glabrous above, rusty-pubescent beneath; lateral nerves 10-18 on either half; tertiary nerves parallel; base acute or obtuse; petiole .3-.7 in. long. *Heads* 4-5-flowered, .3 in. across, before opening, solitary or fascicled, axillary or extra axillary; peduncles stout, .3-1 in. long; bracts coriaceous, ciliate. *Flowers* small, yellowish; male .5-.7 in. across, female smaller. *Perianth* segments 4-6, oblong, membranous. *Stamens* 8-12; filaments villous with long hairs; anthers oblong. *Ovary* glabrous; stigma discoid. *Fruit* ovoid, .3 in. across, about .5 in. long. apiculate, seated on the spreading more or less lobed enlarged perianth; fruiting pedicel tomentose. *Seed* white.

ASSAM, KHASI & JAINTIA HILLS, (5,000 ft.).

Flrs. 9-11. Fr. 4-5.

13. *Litsæa salicifolia* Roxb. Vern. *Digloti*, Ass.; *Thru-muchi*, Garo; *Ing-ing-arong*, Mik.; *Thaia-jing-phang*, Kach; *Dieng-bro-sasse-khlow*, Synt.; *Dieng-lali*, Kh.

A small tree or shrub; branches silky pubescent, slender, horizontal. *Bark* greyish or chocolate-brown, .12 in. thick; blaze yellowish, turning dark-brown. *Leaves* 2.5-7 by .8-2.2 in., narrow-lanceolate or elliptic-oblong, acute or acuminate, chartaceous, glaucous and minutely silky pubescent beneath; lateral nerves 7-13 on either half; petiole .3-.5 in. long, pubescent. *Umbles* 4-6-flowered, fascicled or sometimes racemose; peduncles villous. *Perianth* segments linear-oblong, .08 in. long. *Stamens* 6-7, both or inner 2 series glandular; filaments densely pilose. *Fruit* ellipsoid, .3 in. long, seated on the slightly enlarged, sub-cupular perianth.

LAKHIMPUR, SIBSAGAR, DARRANG, KAMRUP, GOALPARA, GARO HILLS, KHASI & JAINTIA HILLS, NAGA HILLS & NOWGONG, (ascending upto 6,000 ft.).

Flrs. 2-3. Fr. 4-5.

The following varieties are also in record in the region of this flora—*L. attenuata* & *polyneura*.

14. *Litsæa angustifolia* Wall. Vern. *Haibru*, Manip.; *Tharham*, Lush.; *Dudhi-khansau*, Garo; *Khuwai-phang*, Kach.

A bushy evergreen shrub, often sub-scandent; young parts finely pubescent. *Bark* darkish or greyish brown, smooth but with raised dots, .25 in. thick; inside light brown. *Leaves* 3-7 by .35-.5 in., linear-lanceolate, sharply acuminate, coriaceous, glabrous, glaucous beneath; midrib very prominent beneath; base cuneate; lateral nerves 8-11 on either half, very slender, obscure above; petiole .2-.3 in. long. *Umbellules* solitary or fascicled; male heads .16 in. across; peduncle slender, .25-.3 in. long. *Perianth* segments oblong. *Stamens* 6-9; filaments sparsely hairy. *Fruit* ellipsoid-oblong, .4-.5 in. long, smooth, seated on sub-cupular entire enlarged perianth tube; fruiting pedicels .15-.2 in. long, stout.

SIBSAGAR, SYLHET, LUSHAI HILLS, CACHAR, MANIPUR, GARO HILLS.

Usually growing on rocks near water edge; forked stems of sufficient dimensions are used for single yoke for buffaloes.

Flrs. 3-5. Fr. 8-9.

15. *Litsæa oblonga* Wall. Vern. *Dieng-trerthiali*, Kh.

A small tree (30'/30'') or a shrub. *Bark* cinnamon, grey or brownish, .1 in. thick; inside white but thinly yellowish-brown. *Leaves* 4-10 by 1.8-2.7 in., elliptic, elliptic-oblong or oblong-lanceolate, acuminate, acute or obtuse, coriaceous, glabrous; lateral nerves 8-11 on either half, strong and prominent below; base cuneate or acute; petiole .7-1.2 in. long. *Umbellules* 3-6-flowered, clustered on a short stalk, arranged in a manner to make them appear racemed; peduncles sparsely pubescent, .5-.75 in. long; bracts sparsely pubescent. *Fruit* oblong, .5-.6 in. long, seated on a sub-cupular perianth tube.

Dibrugarh, SIBSAGAR, KHASI & JAINTIA HILLS, (ascending upto 6,000 ft.).

Flrs. 9-10. (Flrs. in April in the Plains). Fr. 4.

16. *Litsæa læta* Benth & Hk. f. Vern. *Bon-hoalu*, Ass.; *Chario*, *Jachar-changne*, Duff.; *Nampi-pongeth-Phong-rong*, Mik.; *Koimamchu*, Naga.

A middle-sized (40'/55'') or small tree; young shoots usually finely ferruginous-pubescent. *Bark* greyish or brownish, about .3 in. thick; blaze brownish. *Leaves* 4-12 by .9-4.5 in., elliptic, lanceolate or narrow-oblong, shortly acuminate or acute, coriaceous, glabrous, pubescent beneath; lateral nerves 5-9 on either half, arcuate, prominent beneath, reticulations very fine; base acute; petiole .4-.7 in. long. *Umbellules* in axillary clusters, rarely solitary, .5 in. across, 4-flowered; peduncles pubescent, .5 in. long; bracts 4-5, sparsely pubescent. *Flowers* cream-coloured; perianth segments oblong. *Stamens* 8-10; filaments hairy. *Ovary* 1-celled with 1 pendulous ovule; staminodes about 12. *Fruit* almost white, oblong-ovoid, .7 in. across, seated on the enlarged salver-shaped perianth, fruiting pedicel thickened, about .4 in. long.

N.-E. F. TRACT, GARO HILLS, KHASI & JAINTIA HILLS, (4,000 ft.) CACHAR, SYLHET, DARRANG, SIBSAGAR, LAKHIMPUR.

Brandis says "fruit black" from dried specimens; but almost all the fruits specimens are almost white in the local herbarium. I did not find any fruit of 1 in. in diameter.

Flrs. 11-1. Fr. 2-4.

17. *Litsæa Meissneri* Hk. f. Vern. *Dieng-sor-rang*, Kh.

A small or middle-sized tree, glabrous. *Bark* greenish-brown, warty, .12 in. thick; blaze yellowish, thinly brown. *Leaves* alternate, 2.5-6 by .8-2 in., elliptic-lanceolate or lanceolate, acuminate, coriaceous, glabrous, sub-glaucous beneath; lateral nerves (primary) 7-10 on either half, with a few shorter intermediate ones also slender; base acute; petiole .4-.8 in. long. *Heads* usually pedunculate, 3-4-flowered; bracts 4, concave, coriaceous, fringed with brown silky hairs; *Perianth* segments 4, membranous, oblong. *Stamens* 9; filaments hairy. *Fruit* .7 in. long, oblong-ovoid, smooth. *Seed* bright red.

GARO HILLS, NAGA HILLS, KHASI & JAINTIA HILLS, (upto 6,500 ft.).

Flrs. 2. Fr. 4.

18. *Litsæa Thomsonii* Meissn.

A large tree; branches glabrous, stout. *Leaves* 5-10 by 2.3 in., elliptic-oblong, elliptic-lanceolate or narrow-oblong, acute or acuminate, rigidly coriaceous, brownish, shining above, paler beneath; lateral nerves 6-13 on either half, slender; tertiaries and quarternaries obscure; base acute; petiole .5-1 in. long. *Umbel-heads* rather corymbosely racemed; bracts puberulous. *Fruit* globose, depressed, .6-.8 in. across; lower half included in the cupular perianth; fruiting pedicels thickened, spreading, .3-.4 in. long.

SIBSAGAR (U. N. Kanjilal, No. 1685), SYLHET.

Flrs. 9. Fr. 8, (following year).

19. *Litsæa nitida* Roxb. Vern. *Kathalua*, *Loban* Ass.; *Lhopre*, Nep.; *Supin-um-rong*, Mik.

A middle-sized tree, glabrous. *Bark* grey, rough, about .2 in. thick; inside creamy, yellowish, mottled with brown. *Leaves* 4-10 by 2-3 in., oblanceolate or oblong-obovate, obtuse, sub-acute, rigidly coriaceous, glabrous, dark green, shining, drying blackish; lateral nerves 7-12 on either half; base cuneate or narrowed into the stout petiole .5-1 in. long. *Heads* 4-5-flowered, racemose, .16-.2 in. across, (before opening) glabrous. *Male* inflorescence 2-4 in. long; peduncles about .5 in. long, slender; bracts unequal, glabrous. *Perianth* tube turbinate, silky. *Female* inflorescence 1-2 in. long; peduncles shorter than male. *Fruit* aromatic, yellowish, ellipsoid, .5-.7 in. long, half enclosed in the cupular perianth (enclosed in the obscurely lobed perianth when young).

N. C. HILLS, SYLHET, LAKHIMPUR, SIBSAGAR, NOWGONG, DARRANG, GOALPARA.

A timber tree. Wood used for posts etc.

Flrs. 9-11. Fr. 1-4.

20. *Litsæa Panamonja* Buch. Ham.

A large tree; young shoots puberulous. *Leaves* 5-12 by 2-4 in., oblong or lanceolate, acuminate, coriaceous, glabrous above, pubescent or glabrescent beneath; lateral nerves 10-12 on either half; base cuneate or acute; petiole .5-1 in. long. *Male* umbellules in tomentose racemes, 5-7 in. long, slender, drooping, 6-flowered, .16-.25 in. across, tomentose; bracts 4, coriaceous, concave, subequal. *Perianth* tube funnel-shaped; segments oblong. *Stamens* hirsute at the base. *Female* umbellules in short racemes. *Stigma* dilated. *Fruit* globose, .3 in. across, enclosed in the cupular enlarged perianth (probably not quite mature).

ASSAM (Master), GOALPARA, SYLHET.

Flrs. 3-4. Fr. 4-5.

21. *Litsæa lanuginosa* Nees.

A middle-sized or small tree; young shoots densely clothed with adpressed silky hairs. *Bark* brownish, slightly

rough, lenticellate. *Leaves* crowded at the ends of branchlets, 5-12 by 1·5-3 in., elliptic-lanceolate, oblanceolate or elliptic-oblong, acute or acuminate, coriaceous, tough, silky hairy when young, afterwards glabrous, shining above, glaucous beneath, strongly sub-triplinerved at the base; lateral nerves 3-5 on either half; base narrowed to the petiole, which is 3-9 in. long. *Heads* 4-flowered, densely silky, in clusters about 1 in. across; bracts 4. *Flowers* yellowish, small; pedicels about 2 in. long. *Perianth* segments 4, villous outside. *Stamens* 6, glands of inner series stipitate. *Fruit* 5-6 in. long, ovoid-oblong, seated on the thickened pedicels.

KHASI HILLS, (Griffith) MANIPUR, (8,000 ft.)

Flrs. 2-3. Fr. Cold season.

22. *Litsæa umbrosa* Nees. Vern. *Dieng-soh-tartiat*, Kh.

A middle-sized small evergreen tree or a shrub. *Bark* brownish, lenticellate; young shoots pubescent. *Leaves* alternate, 3-6 by 5-12 in., oblong-elliptic, oblong-lanceolate, acute or acuminate, thinly coriaceous, glabrous above when mature, glaucous beneath with a white bloom, obscurely sub-triplinerved at the base; lateral nerves 2-4 on either half, slender; petiole 5-15 in. long; heads yellowish, white in dense sessile clusters; pedicels about 1 in. long. *Perianth* segments 4, villous without. *Stamens* 6, glands sessile. *Fruit* 3 in. across, 4-5 in. long, oblong-ovoid, purplish, ultimately blackish; pedicels elongated, 5-7 in. long.

MANIPUR, KHASI HILLS, (4,000 ft.).

(In Khasi Hills specimens, the berries are much smaller than described above).

Flrs. 3-5. Fr. 9-11.

23 *Litsæa Mannii* King. Vern. *Dieng--ja-lew-rit*, Kh.

A shrub; stem greyish; branches slender; young shoots, silky pubescent. *Leaves* alternate, scattered, 1·5-3·2 by 5-9 in., elliptic or elliptic-lanceolate, caudate-acuminate, coriaceous, glabrous, shining above, glaucous beneath,

punctate on both surfaces, sub-triplinerved at the base; lateral nerves 2-3 on either half, rather obscure; base acute; petiole .5-.3 in. long. *Male* heads .15 in. across in dense sessile clusters; bracts concave, membranous, sparsely puberulous without. *Fruit* clustered on a very short peduncle (almost sessile), globose, about .08 in. across, mucronate, seated on the lobed perianth pedicel, .1-.2 in. long pubescent.

KHASI HILLS, (4,500-5,000 ft.).

Flrs. 10. Fr. 7.

11. NEOLITSEA Merr.

Evergreen trees. *Leaves* strongly tripli- or sub-triplinerved; buds perulate. *Flowers* diœcious; umbellules 3-7 flowered, in clusters or short racemes; involucral bracts 4. *Stamens* in male flowers 6 (fertile) those of the 2 outer rows eglandular, those of the 2 inner bi-glandular; anther-cells all introrse or the lower lateral, staminodes in female flower usually linear or linear-clavate. *Ovary* ovoid; style thick; stigma peltate, (in male flower 0 or small pistillode). *Berry* globose or ellipsoid, seated on the somewhat enlarged perianth tube and slightly elongated pedicel; pericarp smooth; cotyledons hemispheric.

Neolitsea zeylanica Merr. n. Comb.

A middle sized or small tree. *Bark* greyish-brown, warty, fairly plain, .2 in. thick; inside yellowish, fairly mottled, turning black on exposure; young shoots silky. *Leaves* 3-6 by 1.4-2 in., elliptic or elliptic-lanceolate, acuminate, coriaceous, glabrous, strongly sub-triplinerved at the base; lateral nerves 2-4 on either half; gradually becoming obscure towards the apex; nerves impressed above, raised and prominent beneath; base cuneate; petiole .5-1.2 in. long. *Heads* 4-5-flowered in almost sessile clusters; perianth silky; segments 4-5. *Fruit* ovoid-oblong, .3-.4 in. across; perianth tube small, obscurely cuneate, .1 in. across; pedicel elongated in fruit.

SYLHET, MANIPUR, KHASI & JAINTIA HILLS, (5,200 ft.).

Flrs. 11. Fr. 4.

N. foliosa (Nees) Gamble n. Comb. Var. *Cæsia* Meissn. Vern. *Dieng-um-roa-soh-ja-dao*, Kh.

A middle-sized or large tree; bud scale and bracts silky, otherwise glabrous. *Bark* dark-brown, with vertical lines of small warts, otherwise plain, faintly aromatic, .1-.12 in. thick; inside dark-brown, turning chocolate, fibrous. *Leaves* 3-7 by 1.25-2.5 in., elliptic-acuminate, rigidly coriaceous, glabrous, sub-triplinerved at the base; lateral nerves small, 2-3 on either half; base cuneate or acute; petiole .5-1 in. long. *Flower* heads (male) in shortly peduncled fascicles of 3-4.

Flrs. (male) 11.

12. DODECADENIA Nees.

Dodecadenia paniculata Hk. f.

A small evergreen tree, glabrous. *Leaves* 2-7 by 1.2-2 in., elliptic-oblong, oblong or elliptic-ovate, entire, acute, obtuse or acuminate, coriaceous, glabrous, rather shining above; lateral nerves 8-12 on either half, impressed above, prominent beneath with elegant reticulation of tertiary nerves on the upper surface; base rounded or narrowed into the petiole .3-.7 in. long. *Flowers* bisexual, in sparsely pubescent axillary panicles (often from old stem); pedicels .2-.3 in., rusty-pubescent. *Perianth-tube* short; segments (6-9) oblong, subequal, spreading; filaments hairy, 1 and 2 lines eglandular, 3 and 4 lines biglandular. *Stamens* 18; anthers 4-celled. *Fruit* obovoid or clavate, 1-1.5 by .5-.6 in., seated on the dilated thick flat perianth tube (pedicel thickened into the obconic calyx-tube).

MANIPUR, KHASI & JAINTIA HILLS, (Jowai, upto 5,500 ft.).

Flrs. 10. Fr. 1, (young).

13. LINDERA Thumb.

Shrubs or trees often deciduous. *Leaves* alternate or sub-opposite, penni- or 3-5- nerved; buds covered with scales or naked. *Flowers* usually diœcious, pedicelled, in heads or umbels, which are enclosed in an involucre of 2-5 bracts, sessile or stalked, fascicled or racemosely arranged. *Perianth-tube* very short; segments 7-9, sub-equal, small, petaloid.

Male flower : stamens 9, usually 3-seriate; filaments narrow, first and second series eglandular, third 2-glandular; anthers 2-celled, all introrse. *Fruit* globose or ovoid, seated on the unaltered or disciform, entire or 6-toothed perianth tube.

Leaves persistent :—

Leaves penni-nerved :—

Umbels pedunculate :—

Bracts 4. Stamens 9 :—

Flowers 10-15 in each head :—

Lateral nerves 6-10 :—

Branchlets and inflorescence rusty
or tawny-pubescent. .. 1. *L. assamica*.

Flowers 9 in each head :—

Lateral nerves 5-8 :—

Branchlets and inflorescence glab-
rous. 2. *L. Meissneri*.

Flowers 10-12 in each head :—

Lateral nerves 8-12 :—

Branchlets and inflorescence dense-
ly tomentose. 3. *L. latifolia*.

Umbels sessile or sub-sessile :—

Umbels 4-9-flowered :—

Bracts 4 :—

Leaves 6-9 in. long. 4. *L. reticulata*.

Umbels 6-10-flowered :—

Bracts 5-8, imbricate :—

Leaves 1·5-6 in. long. 5. *L. bifaria*.

Leaves triplinerved at base :—

Leaves obtusely short-acuminate :—

Leaves thinly coriaceous, glaucous beneath,
2·5-4 in. long :—

Ovary glabrous. Fruit globose. .. 6. *L. caudata*

Leaves thinly coriaceous, not glaucous
beneath, 3-5 in. long :—

Ovary pubescent. Fruit ellipsoid. .. 7. *L. pulcherrima*.

Leaves obtusely short-acuminate :—

Leaves coriaceous, not glaucous beneath,
2-3 in. long :—

Bracts 4. Fruit ellipsoid. 8. *L. melastomacea*.

Leaves deciduous :—

Leaves 3-7 nerved at the base :—

Bracts 4. Fruit globose :—

Leaves 2-6 in. long. 9. *L. Neesiana*.

1. **Lindera assamica** Kurz. Vern *Matabhe* or *Bambhe*, Ass.; *Dieng-pakhar*, Kh.

A small tree or shrub; young shoots, tawny silky-pubescent. *Leaves* 3-6·5 by 1-1·8 in., lanceolate or elliptic-lanceolate, acuminate or caudate-acuminate; glabrous and shining above, minutely hairy specially along the nerves, coriaceous, penni-nerved; lateral nerves 6-10 on either side, joined by sub-parallel cross-nerves; base cuneate or acute; petiole ·25-·5 in. long. *Flowers* 10-15 in each head on common peduncle ·4-·1 in. long, which are arranged in racemes or are sometimes solitary, fascicled; bracts glabrous, broad, concave, about ·25-·3 in. long. *Perianth* segments 6, sub-equal, more or less silky outside, lanceolate; pedicels silky, about ·15 in. long. *Male-umbels* ·25 in. across; filaments hairy. *Female-umbels* smaller with shorter peduncles and shorter pedicelled flowers. *Fruit* sub-globose, about ·3 in. long.

LAKHIMPUR, KHASI HILLS, (Umsaw).

Flrs. 2-5. Fr. 6.

2. **Lindera Meissneri** King et Hk. f.

A small tree or shrub. *Leaves* 2-3 in. long, ovate or ovate-lanceolate, caudate-acuminate, chartaceous, quite glabrous; lateral nerves slender, 5-8 on either half. *Heads* silky, 9-flowered; bracts membranous.

MIKIR HILLS, NUKU HILLS, (Simmons) ASSAM, (Brandis, 540, F.B.I. V., p. 182).

A closely allied plant supposed to differ from the preceding species mainly by the glabrous branchlets and chartaceous leaves, the latter with 5-8 pairs of secondary-nerved flowers 9 in each head. The sheets under this name appear to me to belong to the species described above. I have not seen Simmons' sheets from Nuku Hills.

3. **Lindera latifolia** Hk. f. Vern. *Dieng-ja-lang*, Kh. *Dieng-lih* (*kynthai*), Kh.

A moderate-sized tree. *Bark* grey, warty; blaze reddish or yellowish-brown; branchlets, undersurface of leaves and inflorescence grey tawny-tomentose. *Leaves* 5-8 by 2·2-4·5 in., obovate, broadly oblanceolate or elliptic, acuminate to

sub-acute, thin; lateral nerves 8-12 on either side, impressed above, prominent beneath, joined by conspicuous sub-parallel tertiaries; petiole .25-.5 in. long. *Umbels* about .25 in. across, 10-12 flowered on rather stout peduncles, .3-.5 in. long; peduncles solitary, clustered or fascicled on short protuberances; pedicels 2 in. long, pubescent; bracts .4 in., pubescent. *Filaments* hairy. *Fruit* globose, .25 in. across, turning brown to dark chocolate on ripening.

KHASI HILLS, 4,500-6,000 ft.

Fls. 2-4. Fr. 7-10.

4. *Lindera reticulata* Benth. Vern. *Bar-dam-deuka*, Ass.

A small or moderate sized tree. *Bark* brown or greyish-brown, exfoliating in irregular pieces, somewhat rough; blaze yellowish-brown turning darker on exposure; branchlets and undersurface of leaves rusty-tomentose. *Leaves* 6-9 by 1.8-3.2 in., obovate-oblong or oblanceolate-oblong, obtuse or acute; lateral nerves 10-15 on either side, prominent beneath with conspicuous cross nervules; petiole .4-.6 in. long, stout, tomentose. *Umbels* .15 in. across, clustered, sessile or very shortly stalked, 4-9-flowered; bracts 4. *Perianth* segments unequal. *Stamens* 6-12; filaments villous, almost all with stipitate glands. *Fruit* about .5 in. long, ellipsoid or oblong, smooth, shortly pedicelled.

KHASI HILLS about 3,000 ft., SIBSAGAR (Sheet 3027), LAKHIMPUR (455 M.), GOALPARA (Wallich), SYLHET (De Silva).

Fls. 4.

5. *Lindera bifaria* Benth.

A small tree or a large shrub. *Bark* greyish white, thin, very variable as regards hairiness; branchlets nearly glabrous to brown-villous; young shoots densely silky, villous; buds covered with imbricate silky tomentose scales, glabrescent with age. *Leaves* very variable, 1.5-6 by .8-2 in., elliptic

or ovate, lanceolate, acuminate, coriaceous, more or less pubescent along the midrib, specially towards the base, otherwise glabrous above, pubescent to brown-villous beneath; lateral nerves 5-10, prominent beneath; tertiaries faint or strong; petiole about .25 in. long, stout. *Umbels* sessile, solitary or clustered, globose, upto .15 in. across in bud, .3-.4 in. across when open, 6-10-flowered; bracts 6-8, imbricate, rounded, coriaceous, concave, more or less pubescent, about .25 in. long. *Flowers* very small; pedicels short, tomentose. *Perianth* tube tomentose outside; segments 6, glabrate, unequal. *Stamens* 9; filaments glabrous. *Ovary* glabrous. *Fruit* .25 in. across, globose, seated on the small shallow cup-shaped perianth tube.

KHASI & JAINTIA HILLS (upto 4,000 ft.), SIBSAGAR, NAGA HILLS, Kohima, (5,000 Watt.).

Flrs. 2. Fr. 7.

6. *Lindera caudata* Benth. Vern. *Dieng-soh-orthai*, *Dieng-tar-thia*, *Dieng-tyrpath-khlaw*, *Dieng-brau-salu*, *Dieng-la-tyrthiao*, Kh.; *Dieng-tyrthia*, *Dieng-salu*, Synt.

A moderate sized or a small branchy tree. *Bark* dark-grey or brown, nearly smooth; blaze light, often yellowish-brown; young shoots fulvous or rusty silky-pubescent or tomentose; branchlets slender. *Leaves* 2.5-4 by 1.1-1.5 in., ovate to elliptic-lanceolate, caudate-acuminate, thinly coriaceous, glabrous above, glaucous beneath; base 3-nerved; nerves running upto the apex and joined by prominent sub-parallel tertiaries; petiole .3-.5 in. long. *Flowers* about .08 in. across, rather spicate, each flower in the axils of a bract and with 2-concave pubescent bracteoles. *Perianth* villous on both surfaces; segments 6, subequal. *Stamens* 9, villous, 3 inner 2-glandular; in female flowers 6 staminodes each with 2 large glands. *Ovary* glabrous with large discoid stigma. *Fruit* globose, about .25 in. across, speckled yellow and shining when ripe, seated on the 6-cleft perianth tube.

KHASI HILLS 4-5,500 ft.

The wood is cream coloured.

Flrs. 10-1. Fr. 6-8.

7. *Lindera pulcherrima* Benth. Vern. *Dieng-tyrthia-synrang*, *Dieng-tyrsia*, *Dieng-tyrthia-lih*, *Dieng-jabu-rit*, Kh.

A large tree (according to F.B.I. & Brandis), but a small tree judging from specimens observed hitherto in Assam; branchlets pubescent, soon glabrate; buds and new shoots at first silky-villous. *Leaves* 3-5 by $\cdot 7\text{--}1\cdot 7$ in., elliptic-ovate to lanceolate or oblong-lanceolate, caudate-acuminate, thinly coriaceous, pale and often glaucous beneath (acumen often about 1 in. long); base 3-nerved; nerves meeting near the apex, usually raised on both surfaces; petiole slender, $\cdot 3\text{--}\cdot 7$ in. long. *Umbels* 4-6 or sometimes fewer-flowered, in sessile cluster in leaf-axils, enclosed in 4-6 large imbricating concave more or less pubescent deciduous unequal bracts; pedicels silky-tomentose, $\cdot\cdot\cdot 25$ in. long. *Perianth* about $\cdot 15$ in. across, pubescent, nearly or wholly deciduous in fruit; segments 6, sub-equal, oblong. *Stamens* 9, short, nearly glabrous or pubescent. *Ovary* and style pubescent; stigma large. *Fruit* about $\cdot 3$ in. long, ellipsoid, on enlarged pedicels which are $\cdot 3\text{--}\cdot 6$ in. long.

KHASI HILLS 5-6,000 ft.

Flrs. 3-4. Fr. 10-11.

8. *Lindera melastomacea* Benth. Vern. *Diend-si-ing*, Kh.; *Dieng-sap-khniang*, *Dieng-sia-sia*, Synt.

A small tree often only a shrub with stiff erect branches. *Bark* dark yellowish-brown, warty; blaze dull white, irregularly speckled with coarse strands of brown tissue, green underneath the corky layers. *Leaves* ascending, 2-3 by $\cdot 5\text{--}1\cdot 3$ in., obovate, oblanceolate or elliptic-oblong, obtusely short-acuminate, entirely glabrous, green beneath; base with 3 strong nerves, usually raised on both surfaces joined by strong sub-parallel tertiaries, narrowed into the very short petiole, which is $\cdot 15\text{--}\cdot 3$ in. long. *Umbels* 3-5-flowered, sessile or nearly so; peduncle when present very short; bracts 4, coriaceous, glabrous or nearly so, orbicular, concave; pedicels silky-villous, $\cdot 1\text{--}\cdot 15$ in. long. *Perianth* villous within; segments 6. *Stamens* 9; filaments hairy, inner 3, 2-glandular. *Fruit* $\cdot 3$ in. long, ellipsoid, slightly apiculate,

seated on the entire or more or less broken up perianth tube; fruiting pedicel .3-.5 in. long.

KHASI HILLS 3-4,500 ft.

Flrs. 2-3. Fr. 9-11.

9. *Lindera Neesiana Benth.*

A middle sized tree, aromatic, glabrous. *Leaves* 2-6 by .8-1.8 in., ovate-oblong, lanceolate, rarely sub-orbicular, usually acuminate, entire, membranous, glabrous; lateral nerves 4-6 on either half, slender, angular; base obtuse, rounded or cuneate, slightly oblique; irregularly 3-nerved; petiole slender, .3-.9 in. long. *Heads* 5-8-flowered, solitary or clustered (3-6 together), globose, .2-.3 in across, (before opening); bracts 4, membranous. *Perianth* segments almost orbicular, membranous, almost glabrous. *Stamens* 9; filaments, inner biglandular. *Fruit* globose, .1 in. across, seated on the 6-lobed perianth.

MISHMI HILLS (Griffith) (F.B.I. Vol. V. P. 186, Brandis Indian Trees P. 541). No specimen in Forest Herbarium, Shillong.

Flrs. 1-11.

L. *Griffithii Meissn.*

An imperfectly known small tree or large shrub; young shoots silky. *Leaves* 2.5-4.5 by 1-1.7 in., lanceolate or elliptic-lanceolate, acuminate, glabrous above, glabrate or nearly so beneath, penninerved; lateral nerves 6-8, slender, about .25 in. long. *Umbels* upto 12-flowered, peduncled; peduncles about .3 in. long, solitary or fascicled in leaf axils; pedicels about .15 in. long, silky villous. *Perianth* segments elliptic, thinly silky along the back. *Male* flowers not seen. *Ovary* glabrous. *Fruit* not seen.

LAKHIMPUR, (Sheet No. 3393, U. N. Kanjilal).

Flrs. 2.

14. *PURKAYASTHÆA* Purkayastha ex Narayanswami, gen nov.

Purkayasthæa pseudomicropora Purkayastha ex Narayanswami sp. nov. Vern. *Bonhingalo*, Ass.

An evergreen middle-sized tree attaining a height of 66'-70' and girth of about 7' with a spreading crown. *Bark* whitish grey, reddish inside. *Branchlets* marked with the

scars of fallen leaves. *Young* shoots, buds and petioles of the leaves rusty-pubescent. *Leaves* simple, alternate, crowded towards the ends of branchlets, 10-13 by 4-7 in., obovate, apiculate, rarely rounded or retuse, cuneate, entire, rusty-pubescent along the midrib on the upper surface otherwise glabrous, undersurface rusty-pubescent, chartaceous; midrib prominent beneath, marked by a shallow depression above; lateral nerves 13-16, prominent beneath, directed upwards and connected by equally distinct intermediate veins. *Petiole* stout, channelled above, .4 in. long. *Inflorescence* in axillary lax panicles; rachis 5-8 in. in length, rusty-tomentose; flowers hermaphrodite, small, about .1 in. long and .1 in. across, campanulate; pedicel about the same length as the flower, slightly dilated under the flower, tomentose. *Perianth* tube about .05 in., coriaceous, pubescent outside and villous inside; lobes 6, imbricate, about as long as the tube, elliptic-obovate, pubescent outside and villous inside. *Fertile* stamens 6, inserted on the perianth lobes and opposite to them, included; filaments very short, about half the length of the anthers, pubescent, flat; anthers introrse, short and thick, about .05 in. long, 2-celled, opening upwards from the base by valves; valves persistent. *Staminodes* in two rows of 6, the innermost row ovate in outline and villous, .06 in. long, opposite the stamens and closely adpressed to the glabrous ovary; the second row glandular, alternating with the stamens, often attacked by larvæ of insects. *Ovary* about .05 in. long, glabrous, ovoid, one-celled and one-ovuled. *Style* .05 in. long, subulate. *Fruit* drupaceous with a hard rugose pericarp 1.1-1.5 by .8-1 in., obovate-elliptic in outline.

ASSAM : Digboi Res—LAKHIMPUR DISTRICT, 300-500 ft.

Flrs. 8-9. Ripe fruit one year after flowering.

The specimen could not be matched either at Kew or Sibpur Royal Botanic Garden. When I first scrutinized the specimen I thought it might be a new species under the genus *Micropora* as described in Hooker's *Icones Plantarum* t. 1547 (1886), but while I was finally describing the plant Mr. Narayanaswami of the Botanical Survey of India, officiating Curator, Royal Botanic Garden, Sibpur, suggested that it should be described as a new genus because it

could not be included under *Micropora* which derives its name from the fact that the anthers dehisce by minute pores, whereas in this case they open by two valves.—Purkayastha.

(Indian Forester, May 1938).

15. CASSYTHA Linn.

Cassytha filiformis Linn. Vern. *Amarbeli*, Hind.; *Akasbel*, Beng.

A filiform leafless twining parasite, attaching itself by haustoria to the host plant. *Stem* dull-green, puberulous when young, glabrescent with age. *Leaves* none, or reduced to few minute hyaline scales. *Flowers* bisexual, white, minute, 1 in. long when fully formed, in few-flowered lax spikes, from the axils of leaf scales, which are upto 3 in. long. *Bracteoles* 3, connate at the base, broad-ovate, ciliate. *Perianth* lobes 6, in two series; outer smaller, free, nearly to the base, broad-ovate, concave, edges hyaline and ciliate; inner white, valvate, much exceeding the outer, free to more than half the length, concave, oblong, glabrous. *Stamens* in whorls of 3; outermost petaloid, introrse, eglandular; second series sterile and eglandular; third series extrorse and 2-glandular at the base; fourth series reduced to yellow staminodes. *Ovary* free, globose, 1-celled; style subulate. *Fruit* 2 in. across invested by the persistent perianth.

SYLHET, (F.B.I., V., p. 188).

Flrs. & Fr. almost throughout the season.

FAM. 116. HERNANDIACEÆ.

(Engler U. Prantl. iii. 2. 126).

Climbing shrubs or large trees. *Leaves* alternate, exstipulate, pinnate or simple, entire or lobed. *Flowers* 2-sexual or monœcious, regular in cymes or panicles. *Perianth* free or shortly united below in two valved 3-5-merous whorls or in one imbricate, 4-8-merous whorl, rarely 2-partite. *Stamens* 3-5 in one whorl, opposite the outer perianth segments, sometimes alternating with glands or staminodes; anthers opening by valves. *Ovary* inferior, 1-celled; ovule solitary, pendulous, anatropous. *Fruit* dry, indehiscent, sometimes winged. *Seeds* exalbuminous.

ILLIGERA Blume.

This genus had been included under Combretaceæ by Bentham and Hooker in *Genera Plantarum*. The present arrangement follows that of Engler and Prantl. *Pflanzenfamilien*, III. 2. 126.

Scandent shrubs. *Leaves* alternate 3 (or 5)-foliolate. *Leaflets* petiolulate. *Flowers* 2-sexual, in lax cymes, bracteolate. *Calyx*-tube constricted above the ovary; segments 5, patent. *Petals* 5, oblong. *Stamens* 5, epigynous with 2-hooded scales at the base of filaments; anthers valved laterally. *Ovary* 1-celled; ovules solitary, pendulous; style filiform; stigma peltate, undulate. *Fruit* 2-4-winged. *Seeds* oblong; cotyledons plano-convex; radicle included.

Fruit 2-winged :—

Fruit upto 3 in., broad (including wings) :—

Inflorescence cymose panicles :—

Sepals .16 in. long :—

Wings oblong or ovate. 1. *I. appendiculata*.

Fruit 3-3.5 in., broad :—

Inflorescence elongated cymes :—

Sepals .25 in. long :—

Wings orbicular or sub-orbicular. .. 2. *I. khasiana*.

Fruit 2-4-winged, frequently 3 :—

Inflorescence corymbs. 3. *I. villosa*.

1. *Illigera appendiculata* Blume.

An extensive climber (40-80 ft. tall); young parts tawny-pubescent, soon becoming glabrous. *Leaves* trifoliate; common petiole 3-4 in. long. *Leaflets* 2-5 by 1·5-·5 in., variable in shape, elliptic, oblong-ovate or sub-rotund, entire, acute, obtuse or abruptly short, acuminate, sub-coriaceous or membranous, glabrous above, pubescent along the nerves beneath; secondary nerves 3-5 on either half, prominent beneath; base rounded or truncatR or shallow-cordate, often unequal sided; petiolules ·3-·9 in. long. *Flowers* in pendulous lax cymose panicles, ·2-·3 in. across; pedicels pubescent. *Calyx* puberulous; segments ·16 in. long. *Petals* lanceolate. *Stamens* curved inwards. *Fruit* sparsely tomentose, 4-angled, 2-3 by ·8-1·2 in. (including the wings)

ASSAM, KHASI HILLS.

Flrs. 8-11. Fr. 9-1.

Mr. S. T. Dunn in his revision (p. 294, Vol. 38, 1908 Journal of the Linnean Society) mentions that true *I. appendiculata* is a plant with ovate leaves and hairy in the axils of the veins beneath. I examined such specimens (vide Burma No. 11573 Mang P.O. Khant, Mytkyina, Burma and Andamans. Parkinson's 241 of 1915 & 22 of 1913, Forest Research Institute Herbarium), but could not however follow Dunn's revision in separating *I. appendiculata* & *I. trifoliata*.

2. *Illigera Khasiana* C. B. Clarke. Vern. *Kerkerilata*, Ass.; *Jermei-san-nain-blei*, Synt.

A large climber spreading to the tops of tall trees; branchlets striate. *Leaves* 3-foliolate; petiole 2-5 in. long, sometimes coiling like tendrils round supports; leaflets 3-6 by 1-2·7 in., elliptic-lanceolate or oblanceolate or elliptic-ovate, acuminate, narrowed, rounded or cordate and often unequal at the base, thinly coriaceous, minutely punctate, glabrous except for tufts of yellowish hairs on nerves axils beneath; lateral nerves 4-5 on either half, arcuate; petioles ·25-1 in. long. *Flowers* bisexual, ·4-·6 in. long, in lax peduncled pubescent cymes. *Cymes*

compound, arranged on terminal and axillary panicles, 4-10 in. long; pedicels tomentose, .15 in. long with a solitary small ovate or elliptic bracteole at the base. *Perianth* dull-reddish brown, of two whorls of 5 segments each; segments connate in a constricted tube above the inferior ovary, oblong-lanceolate, acuminate, .3-.4 in. long; outer thinly pubescent or puberulous; inner-segments somewhat smaller, villous or densely grey pubescent and each often subtending a minute gland. *Stamens* 5, epigynous; filaments glandular, puberulous, each with 2 white staminodes on each side near the base which are obovate-oblong in outline, clawed, emarginate and excavate at the apex. *Ovary* brownish-tomentose; style 1, filiform, ending in a dilated undulate stigma. *Fruit* 1.4-2 by .3-3.5 in., 2-winged with a sharp longitudinal ridge on either face, wings brown, rounded, nearly glabrous with horizontal striations.

LAKHIMPUR, SIBSAGAR, KHASI & JAINTIA HILLS, 2-3,000 ft.
LUSHAI HILLS, MIKIR HILLS.

Flrs. 10. Fr. 1-2.

3. *Illigera villosa* C. B. Clarke.

Branches fulvous-villous. *Petiole* upto 3.5 in. long. *Leaflets* upto 4.7 in. long and 2.6 in. wide, elliptic-acute, sparsely pilose beneath. *Inflorescence* supra-axillary, corymbose, 1 in. diameter; flowers pink; peduncle 1-1.7 in. long, pubescent as are the branches and short pedicels; bracteoles ovate-obtuse, .05-.12 in. long, rather densely pubescent on both sides, ciliate. *Calyx* campanulate, .35-.4 in. long; tube short; lobes ovate-oblong, acute or obtuse, .26-.34 in. long, .11-.13 in. wide, sparingly setose without, ciliate. *Petals* ovate-oblong, obtuse, .24-.26 in. wide, puberulous on both sides, minutely ciliate. *Staminodes* elliptic-oblong, obtuse, entire, concave, .11 in. long, .05 in. wide, narrowed at the base and almost stalked. *Stamens* .17 in. long; filaments stout, papillose-glandular as are the connectives; anthers .1 in. long; pollen granular. *Ovary* more or less quadrangular, .1-.15 in. long, densely hairy or setose; style slender, .17 in. long, setose. *Fruit*

1·5-2 in. broad, almost glabrous, 2-4-winged, frequently 3-winged.

NAGA HILLS (Clarke's No. 41843) (*Journal Society* Vol. XXV (1890), p. 22); NAGA HILLS—Shipoketami, 1500 m., flrs. July, N. L. Bor 5091; Kohima, 1,500 m., flrs. May. N. L. Bor 6366; (Amplified, *Kew Bulletin* No. 5, 1938).

Creeper used as a febrifuge.

FAM. 117. *PROTEACEÆ*.

Trees or shrubs, rarely herbs. *Leaves* usually alternate, exstipulate, entire or much divided, commonly with a thick cuticle, coriaceous. *Flowers* usually hermaphrodite in racemes, spikes or heads and often very showy. *Perianth* corolline; segments 4, valvate in bud, bent or rolled back when open. *Stamens* 4, adnate, to the sepals; anther-cells 2-introrse, dehiscing longitudinally. *Disc* hypogynous, annular, glandular or of scales, often absent. *Ovary* superior, 1-celled, often oblique; style terminal, tip thickened; stigma terminal or lateral. *Ovules* solitary or 2 or many. *Fruit* various. *Seeds* exalbuminous; cotyledons often unequal; radicle short, inferior or lateral.

HELICIA Lour.

Trees or shrubs. *Leaves* entire or toothed or pinnatifid. *Flowers* regular, hermaphrodite in axillary racemes, usually in pairs, bracteolate; bracts small, caducous. *Perianth* tube slender; segments ovate or oblong, ultimately revolute. *Anthers* oblong, connective produced. *Disk* of 4-hypogynous scale, free or connate. *Ovary* sessile; style slender, terminal; ovules 2. *Fruit* a subglobose hard indehiscent nut. *Seeds* 1-2.

Racemes glabrous :—

Leaves petiolate; petiole 3-1 in. long :—

Fruit 1-1·5 in. across. 1. *H. erratica*.

Leaves sessile or nearly so; petiole 0·2 in.
long :—

Fruit apiculate, 1 in. across. ..	.. 2. <i>H. robusta</i> .
Racemes (rachis) rusty-tomentose :—	
Fruit ·5-·7 in. across. ..	.. 3. <i>H. excelsa</i> .

1. *Helicia erratica* Hk. f. Vern. *Dieng-soh-tyrteit*, *Dieng-lingim-rit*, Khasi; *Dieng-soh-pyrtied*, Synt.

A small or middle sized evergreen tree, glabrous. *Bark* pale brownish, somewhat rough, ·16 in. thick, granular; blaze 1st layer dark-brown with yellow vertical lines and inside light-brown with blackish fibrous strands. *Leaves* 2·8 by 1·2·5 in., obovate, oblanceolate, elliptic-lanceolate, acute or obtuse, entire or coarsely serrate, coriaceous, glabrous, shining above (Leaves drying pale yellow); lateral nerves 6·9 on either half (intermediaries are more conspicuous); base cuneate; petiole ·3·1 in. long. *Flowers* yellowish, slender, ·7··8 in. long. *Racemes* 3·9 in. long. *Fruit* oblique, globose, 1·1·5 in. across, often beaked by the persistent style. *Seeds* light-red.

SYLHET, K. & J. HILLS, (upto 6,000 ft.).
Wood white.

Flrs. 4-6. Fr. 9-1.

2. *Helicia robusta* Wall.

A small tree, quite glabrous. *Bark* brownish and dimpled outside, ·12 in. thick; inside with hard horny dark-brown radical plates generally alternating with broad medullary rays of the wood, the intervening tissue being reddish brown, ·25 in. thick. *Leaves* 4·13 by 1·5·3 in., oblong-lanceolate, obovate or oblong, obtuse or bluntly acuminate, coarsely serrate (often sharply), coriaceous, glabrous; lateral nerves 7·13 on either half, prominent beneath; base narrowed, rounded or obtuse; petiole ·0·2 in. long. *Racemes* 9·12 in. long, glabrous. *Fruit* oblique, globose, about 1 in. across, beaked, abruptly narrowed into a short stalk; the outer covering of the stone is of violet colour and the stone is divided into 3 parts inside.

SIBSAGAR, GARO HILLS, K. & J. HILLS, (3,000 ft.).

Flrs. 7. Fr. 11.

3. *Helicia excelsa* Blume. Vern. *Thekejoy-arong*, Mik.

A medium-sized or large tree; young shoots tomentose, yellowish-brown. *Bark* greyish, warty but plain, .3 in. thick; inside granular. *Leaves* 5-11 by 1.5-5 in., obovate or oblanceolate, acuminate, entire or coarsely serrate, coriaceous, glabrous; lateral nerves 7-10 on either half, impressed above, prominent beneath; base acute or cuneate; petiole .3-1.4 in. long. *Racemes* rusty-tomentose, nearly as long as the leaves. *Ovary* tomentose. *Fruit* subglobose, .5-.7 in. across, smooth.

N. C. HILLS, KHASI HILLS, (5,000 ft.).

Flrs. Rainy season. Fr. Cold season. Ripe fruit often upto May.

***Grevillea robusta*.** *A. Cunningham.* The silver oak.

A large handsome tree; young shoots rusty-tomentose. *Leaves* twice pinnatifid (fern-like) silvery beneath. *Flowers* orange coloured in unilateral racemes. *Follicle* coriaceous, .6-75 in. long; oblique.

Native of AUSTRALIA. Commonly cultivated throughout the province as an avenue tree (specially in tea gardens).

***Hakea acicularis* Knight**=*Hakea obliqua* Lodd.

A xerophytic shrub with rigid woody branches. *Leaves* needle-like. *Fruit* woody, hard.

Native of AUSTRALIA. Cultivated in Shillong.

Flrs. 3.

Banksia (Australian honey-suckle) is also cultivated in gardens.

FAM. 118. THYMELEACEÆ.

Shrubs or trees, rarely herbs, with tough inner bark. *Leaves* alternate less often opposite, simple, entire. *Flowers* usually 2-sexual, axillary or terminal in heads, umbels, clusters, spikes or racemes. *Perianth* regular, 1-seriate, tubular or campanulate, 4-5 lobed; lobes imbricate in bud, often with 1-2 scales at the base. *Stamens* as many as or twice as many as the perianth lobes. *Disk* annular, cupular or of scales. *Ovary* superior, 1-, rarely 2 or more celled; style long or short; ovules solitary or one in each cell, pendulous from near the top of the cell. *Fruit* indehiscent and capsular.

Ovary 1-celled, 1-ovuled. Fruit indehiscent:—

Perianth lobes 4, perianth without scales:—

Style 0 or very short. Leaves alternate,
glabrous or nearly so. **1. Daphne.**

Style present. Leaves alternate and
opposite. **2. Wikstroemia.**

Perianth lobes 5, perianth with scales above
the stamens:—

Fruit with thick pericarp. .. **3. Linostoma.**

Ovary 2-celled, cells 1-ovuled; fruit capsular:—

Perianth campanulate, lobes 5; stamens 10. **4. Aquilaria.**

1. DAPHNE Linn.

Shrubs or small trees. *Leaves* alternate, usually glabrous or nearly so and coriaceous when mature. *Flowers* in terminal or lateral, sessile or peduncled heads or clusters. *Perianth* tubular; lobes 4, spreading; scales 9. *Stamens* 8, in two series, subsessile; anthers dorsifixed. *Ovary* 1-celled; style 0 or very short; stigma capitate. *Fruit* indehiscent, coriaceous or fleshy; testa crustaceous.

Perianth sparingly silky; flower buds not enclosed by involucre-like bracts. **1. D. cannabina.**

Perianth densely silky-pubescent; flower buds enclosed by involucre-like bracts. **2. D. involucreata.**

1. **Daphne cannabina** Wall. Vern. *Ka-dieng-baiong*, Kh.; *Dieng-thlu-thyrmia*, Synt.

A shrub attaining 8 ft.; bark tenacious; branchlets hairy towards the top. *Leaves* 2.5 by .5-1 in., lanceolate to narrow-lanceolate, bluntly acuminate or acute, entire; base often tapering to a short petiole, coriaceous, glabrous, dark green above, pale beneath; lateral nerves 6-8 on either side, slender, rather obscure in green leaves, lower acutely ascending from the midrib, sub-arcuate towards the top, few intermediate nerves between the main secondary nerves, tertiaries reticulate; petiole up to .3 in. long. *Flowers* pure white, pale yellow or purple outside, scented, crowded in terminal or lateral head-like clusters on very short peduncles; peduncles silky; bracts lanceolate or subulate, caducous, .2-.5 in. long, leafy. *Perianth* corolline, cylindrical, tube .4-.8 in. long, often bent, silky outside, lobes oblong to ovate-lanceolate, acute, often with a tuft of hairs at the tip, usually reflexed with age. *Filaments* very short. *Ovary* on a minute sub-truncate stipe which is narrowed towards the base; style very minute; stigma capitate. *Fruit* orange, black or scarlet when ripe, .3-.5 in. long, ovoid or ellipsoid.

KHASI HILLS 5-6,000 ft.

Flrs. & Fr. 8-12.

The species include several forms which differ from one another in the colouring of the perianth, length of the perianth tube and colour and shape of the fruit. As a rule varieties with purplish flowers have fruits which turn purple or nearly black on ripening. Similarly forms with pure white flowers sometimes produce black fruits although normally orange or red fruits are produced. Forms with scarlet red globose fruits also occur which are usually correlated with yellowish or white flowers never with purple flowers. It appears that we are either dealing with a very variable species or several hybrids, of which the parent forms are *D. cannabina* Wall. *D. suriei* Smith and Cave (Records of the Botanical Survey of India, Vol. VI, No. 2, pp. 49-54).

Daphne shillong Banerji. In Kew Bulletin 1927, pp. 75-76.

A shrub about 5-6 ft. high; branchlets with more or less tufted hairs towards the end. *Leaves* variable, 3-6 by 1-1.75 in., lanceolate to elliptic-lanceolate or obovate-lanceolate, acuminate; base acute or cuneate, often undulate, coriaceous, secondary nerves slender, impressed

above, 8-12 on either side, petiole 0 to .3 in. long. *Flowers* fragrant in short peduncled head-like clusters at the ends of branches or on short lateral shoots, creamy; peduncles densely hairy; bracts caducous, sericeous. *Perianth-tube* .5-.7 in. long, silky outside; lobes deltoid, shorter than in the last species; anthers slightly exserted. *Fruit* subglobose, ellipsoid or obovoid, fleshy, scarlet when ripe, about .5-.7 in. long.

KHASI HILLS, Shillong Peak, Dumpep, etc., 5,500-6,000 ft.

This probably represents the high level form of the last species. It differs by its broader leaves, broader perianth lobes and large and more fleshy scarlet fruits. It has also a slightly different season of flowering and fruiting. There are some forms of the last species which appear to be intermediate in character between the two. It is, however, easily recognized in the field.

Flrs. & Fr. 8-12.

2. *Daphne involucrata* Wall. Vern. *Jokriarong*, Mik.; *Dien-tliuh*, *Dieng-soh-tylu*, *Tyloh-synrang*, Kh.

A shrub or sometimes a small tree. *Branchlets* glabrous except at the tips. *Leaves* 3-7 by .75-2 in., oblong-lanceolate to elliptic-lanceolate, acuminate; base narrowed, glabrous, thinly coriaceous; lateral nerves slender, many, 14-22 pairs, arching; petiole .15-.25 in. long. *Flowers* scented, white tinged with pink in few or many flowered peduncled heads, enclosed when young in two imbricating concave involucreal bracts; peduncles .15-1.25 in. long, slender, more or less villous, solitary or fascicled, sometimes borne on slender axillary branches, involucreal bracts obtuse, silky, .25-.35 in. long. *Perianth-tube* .4-.6 in. long, silky-villous; lobes .15-.2 in. long, ovate-acuminate, upper series of anthers near the throat; style minute. *Drupe* black when ripe, ellipsoid.

KHASI & JAINTIA HILLS, 4-6,000 ft., N. CACHAR HILLS, Hotspring, MIKIR HILLS, Jortokbi.

Flrs. 10-11. Fr. 12-2.

Sheet No. 17467 (Naga Hills) appears to be different, but allied to *D. cannabina* Wall.

***D. papyracea* Wallich.** has since been found in K. & J. HILLS—R. N. De.

***Edgeworthia Gardneri* Meissn.**

A large shrub; branches long, scrambling. *Leaves* 3-5 by 1-2 in., oblong-elliptic or elliptic-lanceolate, acute or acuminate, glabrous above,

somewhat pilose beneath; base acute; petiole $\cdot 2\text{--}\cdot 3$ in. long. *Peduncles* simple, $\cdot 5\text{--}1\cdot 5$ in. long, ebracteate. *Flowers* yellow in dense hemispherical heads. *Perianth* sub-villose, tomentose; lobes ovate, obtuse, 4. *Stamens* 8, biseriate. *Receptacle* tubercular, silky. *Ovary* villose. *Fruit* included in the base of the perianth; pericarp coriaceous; testa crustaceous.

MISHMI HILLS, MANIPUR, upto 7,000 ft.

Flrs. 12-6. Fr. 6-9.

2. WIKSTRÆMIA Endl.

Wikstroemia canescens Meissn. Syn. *W. virgata* Meissn. Vern. *Panjung-masi, Ja-tyllu*, Kh.

An erect deciduous shrub with few slender branches; young shoots villous. *Leaves* sub-opposite or alternate, $\cdot 7\text{--}2$ by $\cdot 3\text{--}7$ in., lanceolate to elliptic-oblong, acute, membranous, glabrescent above, more or less silky-pubescent beneath, specially along the midrib; main lateral nerves 5-7 on either side; petiole $\cdot 1$ in. long, hairy. *Flowers* yellow, subsessile, in few flowered heads or spikes. *Perianth* sub-persistent, tube slender, $\cdot 25\text{--}\cdot 35$ in. long, silky outside; lobes 4, short, spreading, obtuse. *Disk* scales 4, linear. *Stamens* 8 in two series, one above the other. *Ovary* villous; style short; stigma large, globose. *Fruit* $\cdot 2\text{--}\cdot 25$ in. long, narrowly ovoid, silky, black when ripe.

KHASI HILLS, 5,500-6,000 ft.

Flrs. 5-7. Fr. 9-10.

3. LINOSTOMA Wall.

Linostoma decandrum Wall. Vern. *Bakalbih*, Ass.; *Ruteng*, Kuki.

A climbing shrub; branchlets lenticellate. *Leaves*, opposite or sub-opposite, $2\text{--}3\cdot 7$ by $\cdot 75\text{--}1\cdot 2$ in., oblong-lanceolate or elliptic-oblong, acuminate, sometimes shortly caudate, glabrous; lateral nerves numerous, subparallel; petiole $\cdot 15\text{--}\cdot 25$ in. long. *Flowers* 2-sexual, greenish white in umbellate 6-10 flowered cymes on long peduncles; peduncles upto about 2 in. long, with 2 bracts which ultimately become enlarged and membranous, sessile, oblong or ovate-oblong, ultimate size $1\text{--}1\cdot 5$ by $\cdot 6\text{--}\cdot 75$ in.; pedicels $\cdot 2\text{--}\cdot 3$ in.

long, jointed. *Perianth* tube glabrous, $\cdot 2\cdot 3$ in. long, ovoid; lobes 5, oblong, about as long as the tube, spreading, throat hairy; scales above the stamens 10, erect, clavate, $\cdot 15$ in. long. *Stamens* 10; filaments filiform, exserted. *Disk* 0. *Ovary* sessile, 1-celled; style filiform. *Fruit* $\cdot 35\cdot 5$ in. long, broadly ellipsoid, base acute, narrowed above, silky-villous towards the base, seated on the base of the perianth tube.

SIBSAGAR, SYLHET, CACHAR.

Flrs. 11. Fr. 1.

4. AQUILARIA Lamk.

***Aquilaria agallocha* Roxb.** Vern. *Agaru, Agar*, Beng.; *Sasi*, Ass.; *Agaru*, Sans.; (Aloe-wood, eagle-wood).

A large evergreen tree; young shoots silky. *Leaves* alternate, $2\cdot 4\cdot 5$ by $\cdot 8\cdot 2$ in., oblong-lanceolate, elliptic to obovate-lanceolate, caudate-acuminate, glabrous or nearly so; base acute; lateral nerves numerous and faint; petiole $\cdot 1\cdot 2$ in. long. *Flowers* white, 2-sexual in terminal umbellate cymes which are sub-sessile or shortly peduncled; inflorescence silky; pedicels $\cdot 2\cdot 3$ in. long, slender. *Perianth* persistent in fruit, campanulate, $\cdot 25\cdot 3$ in. long, silky without, densely villous within, lobes 5, spreading, about as long as the tube, rounded; scales above the stamens 5, densely villous, connate at the base. *Stamens* 10; anthers 10, subsessile. *Disk* 0. *Ovary* subsessile, villous, 2-celled; stigma large, subsessile. *Fruit* capsular, $1\cdot 5\cdot 2$ in. long, obovoid; pericarp coriaceous, densely tomentose.

NOWGONG, CACHAR, SIBSAGAR, KHASI HILLS upto 3,000 ft. Also found in DARRANG, KAMRUP and SYLHET.—R. N. De.

Flrs. 6. Fr. 8.

“In the wood of the stem and larger branches are frequently found irregular masses of harder, dark coloured, highly scented wood (the Eagle-wood of commerce) used as incense, commanding a high price. The bast, when prepared, resembles parchment and was used by the old Kings of Assam to write on.”—Brandis.

Used in India as a perfume and a drug. Also as incense.—R. N. De.

***Aquilaria khasiana* Hallier** (in Meded Herb. Leid., No. 44, 18 (1922)).

An evergreen shrub or a small tree; young parts silky; branches terete, irregularly rugulose, somewhat rough. *Leaves* attenuate, shortly petioled, 4·6·6 by 1·2·2·2 in., cblong or obovate-lanceolate, sub-cuspidate-acuminate, revolute, glabrous except the nerves beneath, darkish green, above, palish green beneath; base acute; lateral nerves close, parallel, irregularly anastomosed; petiole ribbed underneath, ·17·25 in. long. *Flowers* in subsessile terminal or extra-axillary pubescent fascicles. *Calyx* lobes 4 or 5, pubescent outside, greyish tomentose inside, ·12 in. long; tube ·27·31 in. long. *Anthers* sessile, introrsely bi-locular. *Capsule* 1·3 in. long, about ·5 in. broad, stipitate, ovately sub-rhomboid, glabrous, darkish, loculicidal. *Seed* rostrate.

KHASI HILLS, 3,000 ft.

Flrs. 5-6. Fr. 7-10.

FAM. 119. ELÆAGNACEÆ.

Trees or shrubs covered with silvery or brown, often stellate and peltate scales, sometimes with stellate hairs, sometimes with thorn (short, reduced). *Leaves* alternate or opposite, exstipulate, entire. *Flowers* small, 1-2 sexual, white or yellow in axillary fascicles or cymes. *Perianth* tubular, 2-4 cleft (in bisexual and female flowers) the lower portion persistent, often accrescent in fruit; in male flowers perianth reduced to 2-4 lobed limb. *Stamens* in bisexual flowers adnate to the throat of the perianth tube and as many as the segments, in female flowers adnate to the perianth base and twice as many as the segments; filaments free; anthers 2-celled. *Ovary* 1-celled, free; style filiform; stigma lateral; ovule 1, basal, erect, anatropous. *Fruit*

indehiscent, a pseudo-drupe closely invested by the accrescent base of the perianth tube. *Seeds* exalbuminous; embryo straight; radicle inferior.

1. ELÆAGNUS Linn.

Shrubs or small trees, sometimes thorny. *Flowers* solitary or fascicled. *Perianth* tube constricted above the ovary; segments 4 (rarely 6), valvate, deciduous. *Stamens* 4 on the mouth of the perianth tube, alternating with the segments. *Style* linear, included; stigma lateral. *Fruit* with coriaceous or crustaceous endocarp. *Seed* with hard shining testa.

Endocarp ribbed, densely hairy within :—

Fruit ·3 in. long :—

A deciduous shrub. 1. *E. umbellata*.

Fruit about 1 in. long :—

An evergreen shrub. 2. *E. latifolia*.

Endocarp not ribbed, glabrous within :—

Fruit ·2·3 in. long, pyriform. 3. *E. pyriformis*.

1. *Elæagnus umbellata* Thunb.

A much branched thorny deciduous shrub, often forming a dense bush; young shoots clothed with silvery scales. *Leaves* 1·3 by ·3·1 in., elliptic-oblong or elliptic-lanceolate, acute or acuminate, undulate, subcoriaceous, stellately hairy above when young, glabrate in maturity, clothed with bright silvery scales beneath; lateral nerves obscure; base rounded or narrowed; petiole ·2·3 in. long. *Flowers* fragrant, dull white, silvery outside, appearing with the leaves in small axillary clusters. *Perianth* ·2·4 in., constricted above the ovary; segments triangular-ovate; style included. *Fruit* ·3 in. long, oblong-ovoid, succulent, covered with silvery scales; endocarp ribbed, coriaceous.

MANIPUR (Brandis).

The fruit is eaten.

Flrs. 4-6. Fr. Rainy season.

2. *Elæagnus latifolia* Linn. Vern. *Soh-sang*, *Soh-khlur*, *Soh-chhang*, *Mi-soh-sang*, *Dieng-soh-sang*, *Mei-shong-*

klor-tyrneng, Kh.; *Dieng-soh-sylangi*, Synt.; *Birai-asing*, Miri; *Solengi-arikong*, *The-tumda-arong*, Mik.; *Chhokhua*, Garo; *Loh-baroi*, Sylh.; *Mirica-tenga*, *Bon-jara*, Ass.

A large woody evergreen straggling or scandent shrub, often spiny. *Bark* blackish-grey, rough, often with raised lenticels .3 in. thick; blaze light red, turning brownish, fibrous. *Branchlets* densely crowded with ferruginous scales. *Leaves* alternate, very variable, usually 2-6 by 1-3 in., ovate-oblong or elliptic, acute or acuminate, entire or slightly undulate, subcoriaceous, glabrescent above, clothed beneath with silvery or ferruginous scales; lateral nerves 6-8 on either half; base rounded or acute; petiole .3-.5 in. long, channelled. *Flowers* often peduncled, .5 in. long, .2 in. across, scented few or dense in axillary fascicles. *Perianth* clothed outside usually with circular ferruginous scale; tube .15-.25 in. long; pedicels elongated in fruit. *Fruit* 1-1.5 in. long, ovoid, oblong, 8-ribbed, red or yellow when ripe, succulent; endocarp coriaceous, silky inside.

N. E. FRONTIER TRACT, LAKHIMPUR, SIBSAGAR, KAMRUP, GARO HILLS, CACHAR, SYLHET, KHASI & JAINTIA HILLS.

Fruits are edible when ripe.

Flrs. 11-2. Fr. 4-5.

3. *Elæagnus pyriformis* Hk.f. Vern. *Doukhiguti*, Ass.; *Daublut-sitai*. Mech; *Soh-chhang-klor*, *Dieng-soh-blor*, Kh.; *Dieng-sa-shang*, Synt.

A scandent or straggling woody shrub. *Bark* darkish grey, splitting vertically, .3 in. thick; blaze first layer dark-brown and inside red fibrous; young branches densely covered with brown scales. *Leaves* 1-5 by .5-3 in., elliptic or elliptic-oblong, acuminate, entire or slightly undulate, coriaceous, glabrous above, clothed with pale scattered silvery scale beneath. *Flowers* .4-.5 in. long, covered outside with coppery scales, in short axillary clusters; buds club-shaped; pedicel short, .1-.15 in. long. *Fruit* pyriform, .3-.4 in. long, yellowish when ripe, covered with coppery scales; endocarp crustaceous, not ribbed, glabrous.

MISHMI HILLS, LAKHIMPUR, KAMRUP, GOALPARA, KHASI & JAINTIA HILLS (5,000 ft.).

Ripe fruit is eaten.

Flrs. 11-1. Fr. 1-4.

E. hortensis M. Bieb. An exotic appears to be cultivated in some parts of KHASI HILLS for the fruit, which is sweet when ripe and is edible.

FAM. 120. LORANTHACEÆ.

Parasitic evergreen shrubs. *Leaves* usually opposite, less often alternate, entire, exstipulate, coriaceous, or reduced to scales or obsolete. *Flowers* 1-2 sexual, regular or zygomorphic, in racemes spikes heads or fascicles, bracteate, sometimes bracteolate. *Perianth* double; outer (calycine) adnate to the ovary; limb annular or cupular, entire or shortly toothed or 0; the inner petaloid; segments 3-8, valvate in bud, connate into a tube or sometimes free. *Stamens* curved, opposite to the petaloid segments and more or less adnate to them; pistillode is present in male and staminodes in female flowers. *Ovary* 1-celled, inferior; placenta not differentiated; style short or long; stigma simple. *Fruit* drupaceous or baccate with a viscid inner layer by means of which it adheres to the future host; albumen fleshy or 0; embryo straight; radicle superior.

I have followed Prof. B. H. Danser in the system for the Genera of Loranthaceæ.

The following literature have been consulted.

1. A revision of the Philippine Loranthaceæ by Prof. B. H. Danser.

2. A new system for the Genera of Loranthaceæ by Prof. B. H. Danser.

3. Extract Du Bulletin Du Jardin Botanique Du Buitenzorg.

Series III Vol. XVI 1938.

4. Do. Series III Vol. XIV 1936.

5. Do. Series III Vol. XIV 1937.

6. Do. Series III Vol. XIV2 1937.

7. Do. Series III Vol. X 1929.

Leafless :—

Internodes of each stem flattened in one plane :—

No bracts between the flowers. .. 1. **Korthalsella.**

Flattenings of the internodes alternating :—

Bracts below the flowers. .. 2. **Viscum.**

Leafy :—

Ebracteolate :—

Inner perianth 4-5 :—

Petals not hastately broadened :—

Thecæ more oblong to linear :—

Pollen grains bilocellate. .. 3. **Helixanthera.**

Inner perianth 4-6 :—

Petals not hastately dilated above the base :—

Thecæ globose to semi-globose. .. 4. **Hyphear.**

Inner perianth 4 :—

Corolla zygomorphic :—

Stamens straight. .. 5. **Taxillus.**

Corolla sympetalous :—

Ovary and fruit slightly (or not) attenuate at the base :—

Flowers slightly zygomorphic (5) :—

Filaments and anthers normal. .. 6. **Dendrophthœ.**

Ovary and fruit strongly attenuate towards the base :—

Flowers zygomorphic (4 merous) :—

1 bract at the base of each flower. 7. **Scurrula.**

Flowers quite regular (5 merous) :—

Bracts of the involucre free or more or less connate and quite different from the normal leaves. 8. **Tolypanthus.**

Bracteolate :—

3 bracts at the base of each flower :—

Flowers 6-merous. .. 9. **Macrosolen.**

1. **KORTHALSELLA** Van. Tiegh. Ampl. Engler.

Undershrubs, parasite. *Leaves* rudimentary, opposite, the pairs more or less united to collars at the top of the

internodes. *Flowers* in clusters in the leaf axils surrounded by hairs. *Male flower* buds globose; perianth segments 3, triangular, valvate; stamens connate into a globose column with 6 loculi, opening by slits towards the centre; pollen grains globose, poring out from a single central apical pore. *Female flower* bud clavate or pear-shaped; perianth segments 3, short, triangular, valvate. *Ovary* inferior; stigma nipple-shaped. *Fruit* clavate or pear-shaped crowned by the persistent sepals. *Seed* solitary, flattened.

Korthalsea opuntia (Thunb) Merrill. Syn. *Viscum opuntia* Thunb.

An erect branched parasitic undershrub; glabrous, usually 5 in. long; internodes applanate; the unbranched extremities with about 5 internodes. *Basal* portion of the plant cylindrical at base, somewhat flattened at apex; internodes narrow-spathulate to oblong-spathulate .4-1 in. long and .17-.33 in. broad. *Flowers* numerous, axillary, minute. *Fruit* pyriform, .05 in. long.

1,200-1,500 m. KHASI HILLS, Mawrong.

2. VISCUM Linn.

Parasitic shrubs. *Leaves* opposite, flat and thick or reduced to scales. *Flowers* usually monœcious (sometimes diœcious) small, solitary or fascicled. *Bracts* small; bracteoles 2, free or connate in a cup, rarely obsolete. *Perianth* tube in male flowers short, solid in female flowers, adnate to the ovary; lobes 3-4, green or yellow; anthers sessile, adnate to the perianth lobes; cells confluent, dehiscence by many pores. *Ovary* inferior; stigma pulvinate. *Fruit* baccate, succulent with viscid mesocarp. *Seed* adnate to the pericarp; albumen copious; embryo solitary or 2 in each seed.

Branches leafy.	..	..	..	1. <i>V. monoicum</i> .
Branches leafless.	..	..	..	2. <i>V. articulatum</i> .

1. *Viscum monoicum* Roxb. Ex. De Candolle.

A leafy parasitic shrub; branches slender, terete with only last 2 internodes flattened. *Leaves* 1.5-4 by .5-2 in., yellowish green, lanceolate or narrowly elliptic, somewhat falcate,

acute or acuminate, thinly coriaceous, glabrous, 3-5 nerved; base narrowed into the very short petiole which is $\cdot 05\text{--}\cdot 1$ in long. *Flowers* in axillary fascicles; bracteoles apiculate. *Perianth* lobes 4. *Berry* oblong or ellipsoid, shortly stipitate, $\cdot 2\text{--}\cdot 3$ in. long, yellowish.

LAKHIMPUR, DARRANG, GOALPARA, KHASI & JAINTIA HILLS (upto 3,200 ft.).

Parasitic on *Randia dumetorum*, *Dalbergia tamarindifolia*, *Grewia multiflora* and *Macaranga denticulata*.

Flrs. & Fr. Cold season.

2. *Viscum articulatum* Burm.

A pale green much branched often sub-verticillate parasitic shrub. *Branches* flattened, striate, readily disarticulating and contracted at the nodes. *Leaves* $\cdot 75\text{--}2\cdot 25$ by $\cdot 1\text{--}\cdot 25$ in., reduced to scales. *Flowers* minute, 3-4-merous, sessile in clusters of 1-6 at the nodes in connate cupular bracts; lateral flowers usually males. *Perianth* segments triangular, reflexed in male, erect as female flowers. *Berry* about $\cdot 25$ in. long, sub-globose, yellow, smooth.

KHASI & JAINTIA HILLS (upto 5,500 ft.).

Paste of the plant is applied on cuts, etc., for healing. Parasitic on *Loranthus odoratus*, *Castanopsis Hystrix*.

Flrs. & Fr. Cold season.

3. HELIXANTHERA Lour.

Inflorescence racemose or spicate. *Flowers* with a single bract; corolla 4 to 7-merous. *Anthers* basifixed, usually 2-celled.

Inflorescence many-flowered glabrous:—

Style jointed in the middle. .. 1. *H. parasitica*.

Inflorescence many-flowered, tomentose:—

Style not jointed. .. 2. *H. coccinea*.

Inflorescence few-flowered, rusty-pubescent;

young parts pubescent. .. 3. *H. ligustrina*.

Inflorescence few-flowered, glabrous:—

Quite glabrous plant. .. 4. *H. terrestris*.

1. *Helixanthera parasitica* Lour. Syn. *Loranthus pentapetalus* Roxb.

Large, much branching; branchlets stout, terete. *Bark* blackish. *Leaves* 2·5 by ·6·2 in., opposite, sometimes alternate, ovate-lanceolate, rarely elliptic or sub-orbicular, acute or acuminate, entire, glabrous (young leaves reddish); lateral nerves 6·8 on either half; base rounded or alternate; petiole ·3·8 in. long. *Flowers* 4·5 merous (including pedicels and rachis), bright red, adpressed to the rachis which at least when very young is puberulous in axillary racemes, solitary or in pairs or threes. *Bracts* ovate, acute, ciliate. *Corolla* inflated, 5-angled; lobes spreading, about ·1 in. long, reflexed, linear-elliptic; anthers elliptic, exserted; style jointed, upper half terete, lower usually 5-angled. *Fruit* usually ellipsoid, truncate, crimson, ·3 by ·2 in.

SIBSAGAR, LAKHIMPUR, KAMRUP, GOALPARA, N. C. HILLS, KHASI & JAINTIA HILLS (upto 4,000 ft.).

Parasitic on *Litsæa polyantha*, *Antidesma diandrum*, *Vatica lanceæfolia* and *Quercus serrata*.

Flrs. 1·3. Fr. 5·7.

2. *Helixanthera coccinea* (Jack) Danser. Syn. *Loranthus coccinea* Jack.

Branchlets terete, stout, pale-brown, often lenticellate, tubercled. *Leaves* 1·5·4 by ·6·1·5 in., (local species), alternate or sub-opposite, ovate, ovate-lanceolate, bluntly acute, coriaceous, usually sparsely puberulous or glabrate; lateral nerves 4·7 on either half, rather very faint; base rounded or shallow cordate; petiole ·2·4 in. long. *Flowers* yellowish (King) 4-merous, pubescent, in axillary many-flowered rusty-pubescent racemes, solitary or in pairs. *Calyx* cylindric, obscurely 4-toothed. *Petals* crimson; style slender, 4-sided; stigma capitate. *Fruit* ovoid, reddish-brown, 4-angled, crowned by the calyx.

SIBSAGAR, KAMRUP, KHASI HILLS (5,000 ft.).

Parasitic on *Melia Azedarach*.

Flrs. 3·5. Fr. Rainy season.

3. *Helixanthera ligustrina* (Wall) Danser. Syn. *Loranthus ligustrinus* Wall. Vern. *Makariang*, Synt.; *Suthekmi-songepa*, Garo.

A parasitic shrub, often apparently terrestrial. *Branches* terete, stout, lenticellate. *Bark* darkish brown; young parts pubescent. *Leaves* 1·5-4 by ·4-2 in., opposite, the upper sometimes alternate, narrow or elliptic-lanceolate, acute or obtuse, coriaceous, glabrous, shining; nerves obscure; base acute or narrowed into the petiole, ·05-·25 in. long. *Flowers* 4-merous, ·3 in. long, red outside, in axillary few-flowered short racemes. *Calyx* entire. *Petals* linear, reflexed from the middle. *Style* slender; stigma capitate. *Ovary* tomentose. *Fruit* brown when ripe, ·16-·25 by ·09-·1 in.

LAKHIMPUR, DARRANG, GOALPARA. GARO HILLS, KHASI & JAINTIA HILLS (upto 6,000 ft.).

Parasitic on *Machilus Gamblei*, *Phyllanthus Emblica*, *Eurya acuminata*, *Castanopsis tribuloides*, *Ficus clavata*, *Saurauja punduana* and *Glochidion oblatum*.

Flrs. 10-11. (Hills) (3-4 plains). Fr. 1-2 (Rainy season plains).

4. *Helixanthera terrestris* (Hk. f) Danser. Syn. *Loranthus terrestris* Hk. f.

Similar to *Loranthus ligustrina*, quite glabrous, the leaves are thinner and the nerves distinct. *Racemes* larger, probably a root parasite (Brandis).

KHASI HILLS (upto 3,000 ft.). Hooker, Thompson.

4. HYPHEAR Danser.

Flowers hermaphrodite or diœcious, in spikes; each flower subtended by a single bract. *Flowers* in spikes. *Corolla* choripetalous, 5-6-merous. *Anthers* basifixed; thecae 2, globose or semi-globose, each with 2 white or yellowish loculi ·1-·17 in. long. *Style* clavate (in bisexual and female flowers). *Fruit* sub-globose.

Hyphear odoratum (Wall) Danser. Syn. *Loranthus odoratus* Wall.

Glabrous, bushy. *Bark* dark-purplish. *Leaves* 2-6 by ·6-1·5 in., mostly opposite or sub-opposite, lanceolate or elliptic, sometimes falcate, entire, acute or bluntly acuminate,

fleshy (rather thin for the gum) glabrous; nerves very slender; midrib brown or yellow; base rounded or cuneate; petiole .2-.8 in. long. *Flowers* yellowish, fragrant, small in axillary often fascicled spikes. *Calyx* produced beyond the ovary. *Petals* free, .6 in., spathulate. *Fruit* glabrous, ellipsoid.

CACHAR, MANIPUR (Brandis), KHASI & JAINTIA HILLS (upto 6,000 ft.).

Parasitic in *Quercus fenestrata* & *Quercus Griffithii*.

Flrs. Cold season. Fr. 4.

5. TAXILLUS Van Tiegh.

Flowers in 2-5 rayed umbels, each with 1 bract. *Corolla* 4-5-numerous, zygomorphic; tube long, swollen and curved before flowering; lobes 4-5, reflexed, more or less to one side in neck in the flower, one slit usually larger. *Anthers* basifixed, 4-locular. *Style* without articulation, as long as the corolla. *Ovary* and fruit hardly alternate towards the base. *Fruit* ovoid or ellipsoid; exocarp coriaceous, mesocarp viscous.

Taxillus vestitus (Wall) Danser. Syn. *Loranthus vestitus* Wall. Vern. *Soh-maka-riang*, Kh.

A large parasite, sometimes erect (on *Quercus Griffithii*); branches stout, terete, lenticellate. *Bark* brown or blackish; young parts softly tomentose. *Leaves* 1.5-3 by .6-1.5 in., ovate or elliptic, lanceolate, obtuse, coriaceous, glabrous above, brown or tawny tomentose beneath; lateral nerves 4-5 on either half, quite distinct on the undersurface; base rounded or obtuse; petiole .1-.5 in. long. *Flowers* .5-.8 in. long, in sessile or pedunculate axillary fascicles. *Buds* clavate. *Calyx* truncate. *Corolla* tube split; lobes 4, obtuse; anthers red. *Fruit* .3-.5 in., orange, ellipsoid, glabrous.

KHASI & JAINTIA HILLS (6,000 ft.).

Parasitic on *Quercus Griffithii*, *Castanopsis Hystrix* and *Pygeum montanum*.

Flrs. & Fr. 9-1.

6. DENDROPTHOE Martius.

More or less robust shrubs. *Flowers* in simple racemes or spikes, each with 1 bract. *Corolla* slightly zygomorphic; lobes 5; tube more or less dilated, the bud constricted to a neck above the tube, clavate at the top. *Filaments* normal; anthers basifixed, little broader than the filaments, obtuse or acute; thecæ 4, rarely locellate. *Ovary* and fruit slightly (or not) alternate at the base; exocarp coriaceous; mesocarp viscous.

Flowers glabrous :—

Corolla 1·2-2 in. long; lobes shorter than the tube :—

Scarlet or orange. 1. *D. falcata*.

Flowers finely pubescent :—

Corolla ·5-1 in. long; lobes twice the length of the tube, green outside, yellow within.

2. *D. pentandra*.

1. *Dendrophthoe falcata* (Linn. fil) Ettingshausen.
Syn. *Loranthus longiflorus* Desrousseau. Vern. *Bajrangi*, Sylh.; *Tuthekmi*, Garo.

A large glabrous bushy parasite. *Bark* grey or reddish brown. *Leaves* 2·5-6 by ·8-3 in., opposite or sub-opposite, sometimes alternate, very variable in shape, ovate, obovate, obovate-oblong or elliptic, sometimes oblique, obtuse, coriaceous, rather fleshy, glabrous; midrib red; lateral nerves obscure; petiole ·1-·5 in. long, stout. *Flowers* 1-2·5 in. long, orange or scarlet, in dense (10-25 flowered) unilateral, up-curved axillary or supra-axillary racemes, sometimes solitary. *Calyx* tooth produced beyond the ovary. *Corolla* glabrous; tube ·1 in. in diameter at base, gradually expanding to ·2 in. in diameter at apex; lobes 5, shorter than the tube, greenish yellow; style slender, green, sub-persistent; stigma globose. *Berry* ·3-·5 in. long, oblong, black when ripe, crowned with the cupular calyx.

SYLHET, GOALPARA, GARO HILLS, KHASI & JAINTIA HILLS (5,500 ft.).

Parasitic on *Mangifera indica*, *Premna latifolia*, *Hydnocarpus Kurzii*, *Terminalia Chebula*.

Flrs. & Fr. 7-11. (Almost throughout the year).

2. Dendrophoe pentandra (Linn.) Miquel. Syn. *Loranthus pentandrus* Linn.

A parasite of considerable size. *Branch* and branchlets stout, terete, shining grey, lenticellate; youngest parts puberulous. *Leaves* 2-6 by 1·2-4 in., alternate or sub-opposite, variable in shape, elliptic-lanceolate, obovate, obtuse or acute, undulate, coriaceous, glabrous; midrib stout; lateral nerves very faint, reticulation obscure; base cuneate or narrowed into the petiole, which is ·2·5 in. long. *Flowers* finely pubescent in axillary racemes, sometimes fascicled. *Bract* ovate, embracing the base of the calyx. *Calyx* 5-toothed, cupular, tomentose. *Corolla* green outside, yellowish within; lobes 5, equal, linear, twice the length of the tube; style capitate. *Fruit* ovoid, ·3 in. long, crowned by the calyx.

SYLHET (Brandis).

Flrs. 12. Fr. 3.

7. SCURRULA Linn.

Leaves tomentose mealy or scarfy. *Inflorescence* racemose; flowers with a single bract. *Corolla* 4-merous, zygomorphic, narrowed in the middle, somewhat clavate at the apex, recurved. *Anthers* basifixed, obtuse, 4-celled. *Style* as long as the corolla. *Fruit* pyriform, ellipsoid or clavate, exocarp coriaceous; mesocarp viscous; endocarp infundibuliform, quadrangular, woody.

Perianth 4-merous:—

Leaves mealy or scarfy:—

Fruit pyriform. 1. *S. parasitica*.

Fruit clavate. 2. *S. pulverulenta*.

Leaves tomentose:—

Fruit ellipsoid. 3. *S. umbellifer*.

1. Scurrula parasitica Linn. Syn *Loranthus Scurrula* Linn. Vern. *Dieng-mong-karing*, Kh.

A large bushy, very variable parasitic with many distinct varieties; young parts tomentose (rusty or white). *Leaves* 1·5-3·5 in., opposite, elliptic-oblong, ovate-oblong, obovate, obtuse or acute, coriaceous, scurfy or tomentose (rusty or grey) on both surfaces when young, glabrous above when

mature; nerves rather faint; base rounded or cordate; petiole $\cdot 25 \cdot 5$ in. long. *Flowers* 1-2 in. long, in dense axillary fascicles or short racemes. *Buds* club-shaped. *Calyx* quite truncate. *Corolla* tube split, red, $\cdot 25 \cdot 3$ in., portion of the inside purple and pubescent outside, slightly curved; lobes 4, linear, greenish-yellow; filaments flat and purple below, but red and much narrower and immediately below the anthers; style filiform, purple (young first club-shaped, tipped reddish). *Fruit* $\cdot 2 \cdot 3$ in. long, pyriform.

SIBSAGAR, MANIPUR, GARO HILLS, KHASI & JAINTIA HILLS (upto 4,500 ft.).

Parasitic on *Wendlandia Wallichii*, *Grewia Microcos*, *Bridelia montana* and *Myrica Nagi*. It is a very bad pest of *Gmelina arborea*—R. N. De.

Flrs. & Fr. 11-3.

Scurrula gracilifolia (*Schultes*) *Danser* (Syn. *Loranthus Scurrula* Var. *graciliflora* Kurz) is also recorded from the region of the Flora.

2. *Scurrula pulverulenta* (*Wall.*) *G. Don.* Syn. *Loranthus pulverulentus* Wall. Vern. *Mang-kariang*, Kh.; *Makariangbasaw*, Synt.

A common stout woody parasite. *Bark* darkish grey; branches lenticellate; young shoots white, floccose. *Leaves* 2-6 by $\cdot 5 \cdot 3$ in., opposite, broadly ovate or ovate-oblong, acute or obtuse, coriaceous or chartaceous, densely soft tomentose when young on both surfaces; lateral nerves distinct; base rounded or acute; petiole $\cdot 3 \cdot 7$ in. long. *Flowers* 1-1.5 in. long, buff-coloured, in axillary, often fasciculate racemes covered with soft grey tomentum. *Corolla* tube slit on one side, curved lobes 4; style red. *Fruit* club-shaped, supported by a bract at the base, $\cdot 5$ in. long.

Specimen No. 6039 (Kanjilal) has got oblong truncate fruit $\cdot 25 \cdot 3$ in. long, somewhat rugose.

N. E. F. TRACT, KAMRUP, GOALPARA, CACHAR, KHASI & JAINTIA HILLS (upto 4,000 ft.).

Parasitic on *Garuga pinnata*, *Cedrela* sp., *Quercus fenestrata*, *Dillenia indica*, *Symplocos spicata*, *Saurauja punduana*, *Myrica Nagi*, *Pourthiæa arguta*, *Mæsa ramentacea* and *Castanopsis tribuloides*.

Flrs. & Fr. 11-1.

3. *Scurrula umbellifer* (Schult) G. Don. Syn. *Loranthus umbellifer* Schultes. Vern. *Thikthi*, Kuki.

A stout parasite. *Bark* greyish; branchlets lenticellate, youngest parts rusty-pubescent. *Leaves* 1·3-4 by ·5-2 in., opposite or alternate, elliptic or elliptic-oblong, acute or obtuse, coriaceous; lateral nerves 4-7 on either half, distinct: base acute or narrowed into the petiole, which is ·2-·5 in. long. *Flowers* red, 1-1·5 in. long. *Calyx* obscurely 4-toothed; tube very small. *Corolla* tube slender, slightly swollen, curved; lobes 4; stigma capitate. *Fruit* turbinate, ·3 in. long.

CACHAR, KHASI & JAINTIA HILLS (5,500 ft.).

Parasitic on *Vatica lanceæfolia* and *Symplocos spicata*.

Flrs. & Fr. 8-12.

8. *TOLYPANTHUS* Bl., in Schut., Syst., 7, 2, p. 1731 (1830).

***Tolypanthus involucratus* (Roxb.) Van. Tiegh.** Syn. *Loranthus involucratus* Roxb. Vern. *Raghumala*, *Birikh-mara*, Ass.; *Armit-kap*, Tipp.

A slender bushy parasite. *Branches* woody, terete, purplish-brown, lenticellate; young parts tomentose. *Leaves* 2-6 by 1-3·5 in., opposite and alternate, ovate, ovate-lanceolate or elliptic-ovate, obtuse or sub-acute, subcoriaceous, glabrate or pubescent specially along the nerves; lateral nerves 4-5 on either half, slender; base rounded or shallow cordate; petiole ·2-·5 in. long. *Flowers* laxly villous, sessile, in fascicles of 4 in one involucre of 4 large foliaceous bracts. *Bracts* free as long and much wider than the flower. *Calyx* produced over the ovary. *Corolla* 5-cleft; lobes linear; tips recurved. *Fruit* ·2 in. long, oblong, truncate, pubescent.

SIBSAGAR, LAKHIMPUR, KAMRUP, GOALPARA, SYLHET.

Parasitic on *Litsæa* sp., *Lagerstrœmia parviflora*, *Styrax serrulatum*, *Delima sarmentosa*.

Flrs. & Fr. 2-5.

9. *MACROSOLEN* Blume.

Inflorescence spicate or racemose, sometimes contracted to an umbel or almost to a head. *Flowers* bracteate;

bracteoles free or more or less connate; bud constricted to a neck; tip clavate. *Corolla* 6-merous, tube always inflated with 6 keels at the top alternating with the lobes. *Filaments* straight; anthers basifixed, broader before and narrower after opening than the filaments, obtuse; loculi 4, rarely locellate. *Style* articulate above the base. *Fruit* globose or ellipsoidal. *Seed* ellipsoidal.

Flowers in short racemes :—

Leaves glabrous :—

Petiole .1-.3 in. long :—

Fruit pale-yellow. 1. *M. cochinchinensis*.

Flowers sessile or decussate or in short few flowered spikes :—

Leaves glabrous :—

Petiole .3-.7 in. long :—

Fruit bluish (ripe). 2. *M. psilanthus*.

1. *Macrosolen cochinchinensis* (Lour) Van Tiegh.
Syn. *Loranthus ampullaceus* Roxb. & *L. globosus* Roxb. Vern. *Aijheru*, Nep.; *Raghumala*, Ass.

Branches stout, terete, lenticellate. *Bark* pale-brown. *Leaves* 2.5 by 1.2.5 in., usually opposite, rarely alternate, elliptic, elliptic-lanceolate, ovate, broadly acuminate, thickly coriaceous, glabrous, shining; midrib conspicuous, impressed above; lateral nerves irregular, distinct, 5-7 on either half, slender; base acute or cuneate; petiole .1-.3 in. long. *Flowers* .5-.8 in. long, in axillary racemes, single or in pairs or sometimes clustered. *Buds* clavate; bracts ovate; bracteoles connate, cupular. *Calyx* lanceolate, truncate. *Corolla* white including the throat (Kanjilal); tube 6-angled, campanulate and slightly gibbous; lobes 6, reflexed at the middle, glabrous outside; tips purplish. *Fruit* ellipsoid or nearly so, pale-yellow, .3 by .25 in., supported by the bracteole cup.

LAKHIMPUR, NOWGONG, GOALPARA, GARO HILLS.

Parasitic on *Careya arborea*, *Artocarpus integrifolia*, *Salix tetrasperma*, *Machilus bombycina*, *Antidesma* sp., *Shorea robusta*, *Macaranga denticulata*, *Lagerstrœmia parviflora*, and *Eugenia Jambolana*.

Flrs. 12-3. Fr. 3-4.

2. *Macrosolen psilanthus* (Hk. f.) Danser. Syn. *Loranthus psilanthus* Hk. f. Vern. *Soh-pydung-lording*, *Dieng-kyajatparoh*, Kh.

A robust glabrous shrub; branchlets lenticellate. *Baric* pale-whitish, thin, rough. *Leaves* 2·5·5 by 1·2·2 in., opposite, ovate-oblong, ovate-lanceolate or elliptic-lanceolate; blade white, oblong, acute or acuminate, coriaceous, glabrous; midrib stout; nerves slender, rounded or cuneate; petiole ·2··6 in. long. *Flowers* 2·2·5 by ·1 in., sessile on few-flowered umbellate peduncled spike, often from the old wood. *Bracts* and bracteoles shorter than the calyx. *Calyx* tube much longer than the ovary. *Corolla* tubular, very slender; lower half red; upper half green; lobes 6, linear. *Fruit* obovoid, sessile, ·3 in. long, bluish-white when ripe.

ASSAM, MANIPUR (Brandis), KHASI & JAINTIA HILLS (6,000 ft.).

Parasitic on *Quercus dilatata*, *Castanopsis tribuloides* *Castanopsis Hystrix*, *Quercus lineata*, *Sarcosperma* sp., *Schima Wallichii*, *Pyrus Pashia*.

Flrs. 12-4. Fr. Rainy season.

FAM. 121. SANTALACEÆ.

Trees, shrubs or herbs, mostly parasitic or semi-parasitic. *Leaves* entire, alternate or opposite, sometimes scale-like or 0, exstipulate. *Flowers* unisexual or hermaphrodite, regular, in variously arranged inflorescence. *Perianth* 3-8, toothed, lobed or partite; segments often with a tuft of hairs behind the anthers. *Stamens* as many as and opposite to the perianth lobes; anthers 2-celled. *Disc* perigynous or epigynous. *Ovary* nearly free, 1-celled; style short; stigma entire or 3-6 lobed; ovules 1-3; placenta central. *Fruit* nut or drupe. *Seeds* globose or ovoid; testa obsolete or very thin;

albumen copious, fleshy; embryo usually terete, radicle superior.

Santalum album Linn. The sandal wood. *Chandan*, Sans. & Beng. indigenous in Deccan peninsula. It is the most important species of this family and is of greatest economic importance.

Perianth superior; tube adnate to the ovary (not produced above it) :—

Leaves alternate :—

Anther cells divergent or confluent :—

Parasitic on branches or stem. .. 1. **Henslowia.**

Anther cells distinct or parallel :—

Independent trees or shrubs or root parasite :—

Male flowers in axillary pedunculate clusters :—

Stamens without interposed processes, unarmed. .. 2. **Osyris.**

Male flowers in tomentose panicles :—

Stamens with interposed processes, often thorny. .. 3. **Pyralaria.**

1. HENSLOWIA Bl.

Parasitic glabrous shrubs. *Leaves* alternate. *Flowers* minute, monœcious or diœcious, supported by small bracts. *Perianth* tube 0 in male, adnate to the ovary in female; lobes 5-6, valvate. *Stamens* 5-6, inserted on the perianth lobes; anthers didymous. *Ovary* inferior; stigma sub-sessile, discoid or lobed; ovules 2-3. *Drupe* ovoid, obovoid-ellipsoid or sub-globose; endocarp hard; embryo linear.

Branches densely pustulate :—

Leaves obovate to spatulate :—

Bracts covering the whole length of the fruiting pedicel. .. 1. *H. granulata.*

Branches smooth or sparingly pustulate :—

Leaves elliptic-ovate to orbicular :—

Bracts at base and below the fruit. .. 2. *H. heterantha.*

1. **Henslowia granulata** Hk. f.

A small parasitic shrub. *Branches* densely pustulate. *Leaves* 1-2 by .4-.9 in., obovate to spatulate, entire, obtuse,

coriaceous, thick, glabrous; lateral nerves 5-9, basal nerve not very distinct; base narrowed into a short petiole. *Fruiting* pedicel clothed with imbricating bracts the whole length. *Perianth* 5-lobed; female flowers without stamens; stigma obscurely lobed. *Fruit* small, obovoid; pyrene .3-.4 in. long, 5-furrowed.

KHASI HILLS (5-6,000 ft.).

Flrs. 7. Fr. Cold season (11).

2. *Henslowia heterantha* Hk. f. & T.

A small parasitic shrub. *Branches* pale-brown, sometimes parasitic (on *Leea bracteata*). *Leaves* variable, 1-3.5 by .4-1.5 in., obovate to orbicular, entire, obtuse, thickly coriaceous, glabrous, with 5-9 basal nerves, more prominent beneath; base narrowed into a short petiole which is .05-.1 in. long. *Male flowers* sessile in pedunculate heads. *Female flowers* with or without imperfect stamens. *Fruiting* pedicels clothed with bracts at the base and tips only; stigma shortly 5-lobed, sub-sessile. *Fruit* small, red, ellipsoid, fascicled in pedicels, .13 in. long; pyrene 5-6-furrowed.

MANIPUR, KHASI & JAINTIA HILLS (5,000 ft.).

Flrs. 10-2. Fr. Hot season (6).

2. OSYRIS Wall.

Osyris arborea Wall.

A fairly large twiggy glabrous shrub or small tree; branchlets sharply 3-angled. *Leaves* alternate, 1-2.5 by .4-.8 in., obovate, elliptic-oblong or lanceolate, entire, mucronate, coriaceous, glabrous; midrib prominent beneath; petiole sub-sessile or short, emarginate. *Flowers* minute, polygamous; male-flowers in axillary peduncled clusters; female-flowers usually solitary, axillary, on long slender pedicels. *Perianth* superior, obconical; segments valvate. *Drupe* sub-globose, .3 in. across, glabrous, red when ripe.

MANIPUR (Watt. 6679).

Flrs. Almost throughout the year. Fr. Cold season chiefly.

3. PYRULARIA A.DC.

Pyrularia edulis A.DC. Syn. *Sphærocarya edulis* Wall.
Vern *Dieng-soh-klong*, Kh.; *Thing-beng*, Mik.

A small or middle sized deciduous tree, usually thorny (U. Kanjilal says nerves are thorny) enclosed by linear silky imbricating scales. *Leaves* 2-6 by .7-2.5 in., elliptic-oblong or ovate-oblong, acute or acuminate, entire or obscurely crenulate towards the apex, coriaceous, glabrous, shining above; lateral nerves 4-6 on either half, oblique, arcuate, impressed above, prominent beneath; petiole .1-.5 in. long. *Male flowers* in tomentose racemose panicles. *Female* solitary. *Perianth* tube solid in the male, in the female adnate to the ovary. *Male* perianth segments 5, triangular, acute. *Stamens* 5. *Ovary* inferior, clavate, pubescent; stigmas capitate; style short. *Drupe* pyriform or globose, 1-2 in. long, narrowed into a stout stalk, crowned with the perianth lobes. *Seeds* globose.

MISHMI HILLS, NAGA HILLS, MIKIR HILLS, KHASI & JAINTIA HILLS (upto 5,000 ft.).

Fruit edible. (Brandis).

Flrs. 4-6. Fr. 8-11.

FAM. 122. BALANOPHORACEÆ.

Reddish or yellow parasites (without chlorophyll) on tree roots to which the tuberous rhizome is attached by suckers. *Leaves* 0 or scanty. *Inflorescence* arises from the rhizome (sometimes developed within the rhizome and breaking through it) and forms into a spike or head. *Flowers* small, monœcious. *Male flowers*: perianth of 3-4 valvate lobes or 9 free or connate. *Stamens* as many as perianth lobes or more. *Female flowers*: perianth usually 0. *Ovary* 1-2-celled (rarely 3); ovule 1 in each cell. *Fruit* minute or drupe-like. *Seeds* usually adherent to the pericarp; testa thin or 0; albumen granular and oily; embryo very minute.

***Balanophora dioica* Brown.**

Root parasite. *Rootstocks* tuberculous, each tubercle capable of producing a shoot. *Shoots* 1·5-2·5 in., somewhat stouter, covered with imbricating minutely rugose glabrous scales. *Flowers* in a fleshy clubshaped receptacle. *Perianth* surrounded by fleshy linear truncate bracts, which are somewhat reddish in colour almost square-headed. *Heads* ovoid. ·6 by ·5 in. *Perianth* segments white, generally 4, with occasionally a narrower 5th., very rarely a similar 6th., fleshy, ovate, concave, valvate, reflexed after opening, ·06 by ·05 in. *Anthers* only one, sessile, domeshaped, covered with wavy parallel ridges which bear pollen and bursts open before the perianth lobes expand. *Some* male flowers especially those that are borne on the lower half of the head are shortly stalked, others are sessile. *Female flower* heads oblong, ·75 by ·4 in. *Flowers* are very closely packed on the soft fleshy receptacle. *Stigma* protruded, large, white, many times larger than what appears to be the nut; style terminal.

KHASI & JAINTIA HILLS.

Flrs. & Fr. Cold season.

B. polyandra *Griff.* is also recorded from the region of the flora.

Rhopalocnemis phalloides *Jungh.*

A stout fleshy herb. *Peduncles* very stout, 1-4 in. long; flowers diœcious; heads 3-8 in. long. *Male Flowers*: filaments velvety. *Female Flowers* minute.

KHASI & JAINTIA HILLS (5-6,000 ft.) Griffith. (F.B.I. V. P. 239).

FAM. 122(a). BUXACEÆ (*Engler* U. Prantl. III 5. 130).

Evergreen shrub without latex. *Leaves* exstipulate, leathery. *Flowers* in heads or spikes, unisexual, regular, apetalous or naked; stamens 4- many. *Ovary* 3-locular; styles 3, persistent on the fruit; ovules pendulous, anatropous, 1-2 in each cell; *raphe* dorsal. *Fruit* loculicidal capsule or drupe. *Seed* with or without caruncle; endosperm present.

Leaves coriaceous :—

Leaves alternate; fruit indehiscent.	..	1.	<i>Sarcococca</i> .
Leaves opposite; fruit loculicidally dehiscent capsule.	..	2.	<i>Buxus</i> .

Buxus sempervirens *Linn.* The box wood tree.

A small or middle sized tree; branchlets 4-sided; bark yellowish grey, soft, corky, fissured on old stems. *Leaves* opposite 1-3 by .2-4 in., linear-oblong or lanceolate, acute, obtuse or retuse, coriaceous, shining, glabrous; base rounded or obtuse; petiole very short. *Flowers* sessile, monœcious, bracteate, in short congested axillary spikes. *Male flowers* perianth (calycine) 2 pairs, imbricate one under the other, yellowish; stamens 4, free, exserte. *Female flowers* perianth (calycine) 6 in 2 or 3 series all imbricate, outer smallest, yellowish. *Ovary* 3-celled; style 3, simple, short, thick; ovules 2 in each cell. *Capsule* .5 in. long, ovoid.

loculicidally 3-valved. *Seeds* oblong, trigonous; testa black, shining; albumen fleshy.

Shillong, KHASI HILLS, (Planted ?)

Box wood, yellowish white. Used for engraving, turning, carving and mathematical instruments.

Flrs. 5-7. Fr. 7-8.

SARCOCOCCA Lindl.

***Sarcococca pruniformis* Lindl.** Vern. *Chilne*, Nep.; *Tiw-deng-pah*, Khasi.

An evergreen shrub (10 $\frac{1}{3}$ ") glabrous, often gregarious. *Bark* green. *Leaves* variable, 2.6-5 by .8-2 in., elliptic, lanceolate or elliptic-lanceolate, acuminate, quite entire, coriaceous, glabrous, shining above, conspicuously triplinerved at the base; other lateral nerves above the basal pair; fainter midrib impressed above, prominent beneath; base usually rounded, sometimes acute; petiole .2-.7 in. long. *Flowers* .3 in. across, pale yellow in short axillary racemes; bracts whitish, decussate. *Sepals* 4, biseriate, imbricate. *Stamens* 4, free, opposite to sepals and much longer than the sepals. *Ovary* 2-3-celled; ovules 2 in each cell. *Fruit* .3-.5 in. long, ovoid, purple when ripe.

MANIPUR, NAGA HILLS, K. & J. HILLS (upto 8,000 ft).

Flrs. 4-5. Fr. 6-7.

FAM. 123. EUPHORBIACEÆ.

Mostly shrubs or trees, a few herbaceous, rarely climbers, often with milky juice. *Leaves* alternate, sometimes opposite above and alternate below, usually stipulate (often represented by hair like bodies, glands or thorns). *Flowers* usually small, unisexual, monœcious or diœcious. *Inflorescence* usually complex, almost of every type; perianth is sometimes 2-whorled, 5-merous, but more often only one (calycine) whorl, sometimes the perianth is absent in both sexes. *Calyx* often different in both sexes. *Stamens* 1-merous, free or united in various ways; anthers usually 2-celled, rarely 4-celled, dehiscing longitudinally or sometimes transversely. *Disc* various, acute or entire, lobed or of few scales or 0. *Ovary* usually 3-locular; style bilobed; ovules 1 or 2 in each loculus, collateral, pendulous, anatropous, with vertical raphe; micropyle is often (in many genera) covered by a caruncle which is also found in the seed. *Fruit* usually a schizocarp capsule, sometimes indehiscent and drupaceous. *Seeds* albuminous; embryo straight; radicle superior; cotyledons fleshy, broad and flat.

Flower heads resembling single flower consisting of pedicelled bracteoles; stamens in male flowers surrounding a single female pedicelled flower :—

Involucre regular or nearly so, 4-5 lobed :—

Ovary-cells 1-ovuled.

1. Euphorbia.

Flowers distinct, not contained in an involucre, not united in heads :—

Ovary cells 2-ovuled :—

Leaves compound, trifoliolate :—

Flowers paniced :—

Calyx 5-lobed.

2. Bischofia.

Leaves simple, alternate :—

Petals present :—

Calyx valvate :—

Ovary 2-celled :—

Fruit drupaceous with 2-pyrenes. .. **3. Bridelia.**

Ovary 3-celled :—

Fruit capsular. .. **4. Cleistanthus.**

Calyx imbricate :—

Male disc 5-lobed :—

Cotyledons crumpled. .. 5. *Actephila*.

Male disc of 5-bifid glands :—

Cotyledons flat. .. 6. *Andrachne*.

Petals wanting :—

Calyx segments 5 in both male and female :—

Stamens 5; filaments connate :—

Capsule small, the crustaceous cocci splitting into two. .. 7. *Neopeltandra*.

Stamens 3; filaments connate wholly or partially (some times not at all) :—

Capsule with 3-crustaceous or thin 2-valved cocci. .. 8. *Phyllanthus*.

Calyx segments 4 in male, 6 in female :—

Stamens 2 or 4, filaments connate :—

Capsule with 3 thin 2-valved cocci. .. 9. *Reidia*.

Calyx segments 4 in both male and female :—

Stamens 4; filaments free :—

Capsule globose, 6-seeded. .. 10. *Prosorus*.

Calyx segments 5-6 in both sexes :—

Stamens 5; filaments free :—

Berry 2-celled, 3-seeded. .. 11. *Flueggeopsis*.

Calyx segments 5 :—

Stamens 5 in 2-series; outer filaments free, inner connate :—

Fruit a small fleshy 5-12-celled berry. .. 12. *Kirgenelia*.

Calyx segments 5-6 :—

Stamens 3; filaments connate in a column :—

Fruit large; depressed globose, fleshy, with 3-bony two-valved cocci. .. 13. *Emblica*.

Calyx segments 5 :—

Stamens 5 or fewer :—

Fruit dry or fleshy. .. 14. *Flueggea*.

Stamens 4-8 :—

Fruit capsular, globose :—

Seeds imbedded in an aril. .. 15. *Baccaurea*.

Stamens 1-5 :—

Fruit capsular, bursting irregularly :—

Seeds without aril. .. 16. *Aporosa*.

Fruit drupaceous :—

Petiole less than 1 in. :—

Ovary 1-celled, raphe ventral. .. 17. *Antidesma*.

Petiole more than 1 in. long :—

Ovary imperfectly 2-celled. .. 18. *Daphni-phyllum*.

Petals 0 :—

Male flowers solitary in clusters or fascicles :—

Styles and style-arms slender :—

Disc combined with the calyx segments; the
stamens in column :—

Anthers adnate to the angle of the trigono-
us column :—

Calyx of male and female spreading .. 19. **Sauropus.**

Anthers adnate to the whole length of the
column :—

Calyx of male flowers turbinate, that of
female flower spreading. .. 20. **Breynia.**

Style-arms much dilated :—

Fruit drupaceous, indehiscent :—

Stamens 4-many :—

Ovary 2-4-celled :—

Drupe 2-4-seeded. .. 21. **Dryptes.**
(**Cyclostemon**)

Stamens 2-4 :—

Drupe 1-seeded. .. 22. **Putranjiva.**

Style confluent into a long or short column or
cone, slightly toothed at the apex :—

Stamens 3-8, connate :—

Disc obsolete :—

Capsule of 3 or more 2-valved cocci. .. 23. **Glochidion.**

Ovary cells 1-ovuled :—

Petals present :—

Inflorescence terminal :—

Flowers in androgynous compound cymes :—

Calyx segments 5, imbricate :—

Stamens 8-12. .. 24. **Jatropha.**

Calyx segments 2-3, valvate :—

Stamens 8-20. .. 25. **Aleurites.**

Flowers in androgynous spikes or racemes :—

Calyx segments imbricate or valvate;

filaments inflexed in bud :—

Stamens 10-30. .. 26. **Croton.**

Inflorescence usually axillary :—

Flowers racemed or paniced :—

Sepals imbricate, not enlarged in fruit :—

Style short, bifid :—

Stamens 3; anthers sessile or on a
cylindric column. .. 27. **Trigono-**
stemon.

Stamens 8-35. .. 28. **Ostodes.**

Sepals imbricate, usually enlarged in
fruit :—

Flowers in male apetalous. .. 29. **Blachia.**

- Sepals valvate :—
 Stellate-tomentose anther cells contiguous, parallel. 30. **Sumbavia.**
- Petals O. Calyx campanulate :—
 Stamens 10, free. 31. **Manihot.**
 Anthers sessile, 5-10, adnate to a column. .. 32. **Hevea.**
- Petals O. Sepals imbricate :—
 Male flowers in fascicles :—
 Fruit smooth, tardily dehiscent :—
 Leaves pellucid-punctate. 33. **Gelonium.**
 Fruit capsular, echinate. 34. **Chætocarpus.**
- Male flowers in paniced cymes :—
 Capsule of two-valved cocci. 35. **Baliospermum.**
- Petals O. Calyx sub-vertically 4-lobed; leaves not punctate :—
 Male flowers racemed :—
 Fruit indehiscent. 36. **Endospermum.**
- Petals O. Sepal or calyx segments valvate :—
 Trees or shrubs :—
 Filaments free :—
 Stamens 2 or 3 :—
 Male calyx 2-3 fid. 37. **Sapium.**
 Male calyx of 3-sepals. 38. **Excœcaria.**
- Filaments usually free :—
 Anthers 2-celled :—
 Stamens 6-many :—
 Leaves alternate :—
 Anther-cells divaricate :—
 Style laciniate. 39. **Acalypha.**
 Style entire. 40. **Claoxylon.**
- Anther-cells contiguous, parallel :—
 Filaments slender :—
 Cocci crustaceous, 2-4-valved. .. 41. **Alchornea.**
- Filaments free or united at base; anthers 2-celled :—
 Stamens numerous :—
 Fruit indehiscent :—
 Style linear. 42. **Trewia.**
- Fruit capsular :—
 Style plumose. 43. **Mallotus.**
- Anthers 4-celled or 2-celled, 4-valved :—
 Stamens 1-many :—
 Capsule large :—
 Style entire. 44. **Macaranga.**

- Capsule small :—
 Style branched. 45. *Cleidion*.
- Filaments connate in bundles :—
 Staminal bundles indefinite :—
 Leaves entire, penni-nerved. .. 46. *Homonoia*.
 Leaves palmately lobed. ... 47. *Ricinus*.
- Twining shrubs or climbers with stinging hairs :—
 Cocci not winged :—
 Calyx 3-lobed :—
 Calyx not enlarged in fruit. .. 48. *Cnesmone*.
 Calyx 3-5-lobed :—
 Calyx of fruit accrescent. .. 49. *Tragia*.
- Without stinging hairs :—
 Cocci winged. 50. *Pterococcus*.

1. EUPHORBIA Linn.

Herbs, shrubs or trees of various habits, always with milky juice; stem and branches fleshy. *Leaves* alternate or opposite, usually entire, often early deciduous or much reduced; stipules various. *Flowers* monœcious, pedicellate; flower heads resembling single flower, combined in an inflorescence of many male florets, surrounding a single female flower accompanied by many bracteoles. *Involucre* regular with 4-5 sepaloid lobes, campanulate; sinuses between the involucreal lobes with thick glands which have sometimes petaloid limbs, processes or horns; bracteoles setaceous, sometimes combined in a sheath or 0. *Perianth* 0, or of minute scales. *Male florets*: stamens 1, jointed on a pedicel; anthers 2-celled, opening longitudinally. *Female florets*: pedicels often recurved; ovary 3-celled; style 3, free or connate; stigma entire or bifid; ovules solitary in each cell. *Fruit* a capsule of three 2-valved cocci, dehiscent; cocci separating elastically from a persistent axis. *Seeds* albuminous; testa more or less crustaceous; cotyledons broad, flat; radicle superior.

Armed (with stipular spines) :—

Style simple; stigma capitate :—

Leaves 4 in. long, or more :—

Branches subterete :—

Stipular spines from distant tubercles. .. 1. *E. Nivulia*.

Branches angled :—

Stipular spines arising from sub-confluent
tubercles arranged on ridges in vertical
rows. 2. *E. neriifolia*.

1. Euphorbia Nivulia Ham. Vern. *Dieng-syrah*,
Kh.; *Sua*, Synt.

A small tree or a shrub. *Bark* thick, corky, furrowed on old stem; branches fleshy subterete; tubercles truncate, bearing 2 stipular spines, .2-.5 in. long. *Leaves* crowded at the ends of branches, caducous, alternate, 5-10 by 1.25-2.5 in., oblanceolate, obovate, spathulate or rounded, mucronate, fleshy, glabrous; nerves obscure; base narrowed; leaves sessile or sub-sessile. *Flower heads* peduncled, cymose from axils of fallen leaves. *Involucres* greenish, transversely oblong. *Capsule* about .4 in. across, trigonous. *Seeds* small, round, smooth.

KHASI & JAINTIA HILLS. Common round homesteads (probably cultivated).

Flrs. 2-3. Fr. 4-6.

2. Euphorbia neriifolia Linn. Vern. *Sar-a* Kh.;
Hiju-arong, Mik.; *Hiju*, Ass.

A shrub or small tree, glabrous; branches obscurely 5-angled with vertical rows of tubercles bearing sharp stipular thorns, which are sub-confluent. *Leaves* crowded at the ends of branches, deciduous, 4-8 by 1.5-2.5 in., obovate-oblong or obovate-spathulate, sub-acute, mucronate, fleshy, smooth, glabrous; base tapering, sessile or almost so; stipular spines about .5 in. long. *Involucres* ternate, forming shortly pedunculate cymes, solitary or 2; central flowers male; lateral bisexual; bracteoles many. *Stamens* many in bundles. *Styles* connate. *Capsule* about .25 in. across.

KHASI & JAINTIA HILLS; Plains of ASSAM. Apparently cultivated.

Worshipped by the Meches in Goalpara.

Flrs. 2-3. Fr. 4-5.

E. hirta Linn. (Syn, *E. pilulifera* Linn.).

An annual hispid herb. *Leaves* opposite elliptic-oblong to oblong-lanceolate, acute, dentate or serrulate; base obliquely cordate, shortly petiolate.

Mentioned by U. N. Kanjilal as occurring in N. C. HILLS & KHASI & JAINTIA HILLS. (No specimen in Forest Herbarium, Shillong).

E. khasyana Boiss. Vern. *Soh-kyrmoit-blang*, Kh.

A perennial herb. *Leaves* .5-2 by .2-.5 in., elliptic-lanceolate, obtuse, glabrous beneath except the nerves, which are too obscure.

K. & J. HILL, fairly common in grass land (upto 600 ft.).

Fr. 11.

E. hypericifolia Linn.

A slender annual. *Leaves* opposite, .3-.9 by .05 in., somewhat inequilateral, narrow-oblong, obtuse, serrate, sparsely pubescent; petiole .0-.5 in. long; lateral nerves 3-4 on either half, distinct.

Plains of ASSAM.

Flrs. 11.

E. Bojeri Hook.

With fleshy thick stem and deciduous leaves.

Cultivated in Shillong.

E. antiquorum Linn.

A large cactus-like shrub.

Cultivated in ASSAM for fencing. N. E. F. TRACT (Sadiya Block), UPPER ASSAM. Burkill's No. (36682, 36508).

Flrs. 1.

E. Maddeni Boiss. **E. thymifolia** Burm. & **E. Wallichii** Hk. f. are recorded from the region of the "Flora."

2. BISCHOFIA Blume.

Bischofia javanica Bl. Vern. *Thai-jilit*, Kach.; *Takkirasing*, Miri; *Urium*, Ass.; *Sintir-asing*, Balipara; *Mebuchangne*, Duff.; *Dieng-soh-tung*, *Dieng-Jameu*, Kh.; *Jhoki*, Cach.; *Khung-thli*, Lush.; *Khong-shi*, Kuki; *Khung-thi*, Tipp.; *Jokki*, Sylh.; *Thaiso*, Mech.; *Phang-put*, Mik.; *Phung-arong*, Mik.; *Naiching*, Naga; *Bolasri*, *Thichri*, *Asri*, Garo; *Dieng-satung*, Synt.

A large deciduous tree with tall cylindric trunk and often of great girth (100'/15') usually with a spreading

crown. *Bark* dark brown outside; inside reddish, exuding reddish gum in thin parallel lines. *Leaves* alternate, 3-foliolate (sometimes 5-foliolate on luxuriant young shoots); common petiole 3-8 in. long. *Leaflets* 3-6 by 1.5-3 in., elliptic or ovate-oblong, acuminate, usually crenate, glabrous; lateral nerves 6-8 on either half, slender, petiolulate, terminal leaflet much longer. *Flowers* greenish, diœcious, apetalous in paniculate racemes. *Male flowers* shortly pedicellate; corolla segments 5, obtuse, concave, concealing the anthers; stamens 5; anthers globular; pistillode present in the form of a flat disc. *Female flowers* pedicelled (longer than male); sepals ovate, caducous; styles linear, entire; ovary 3 or 4-celled; ovules 2 in each cell. *Fruit* globose, baccate, fleshy, .25-.5 in. across, exuding a gummy juice when squeezed, brown when fully ripe, supported on a thickened pedicel. *Seeds* smooth, shining; albumen fleshy; cotyledons flat.

Common throughout the Province (upto 4,000 ft.)

Wood red, moderately hard, but rather rough grained; heart wood small, darker; weight 40-50 lbs. per cft. More durable in water, used for various building purposes and dug-outs, splits badly and converted timber seasons very unsatisfactorily. Tried for impregnated Railway slippers, but very refractory to treatment.

Leaves are used to dye bamboo baskets, fans, etc.

Flrs. 3-5. Fr. Rainy season.

3. BRIDELIA Willd.

Shrubs or trees, sometimes climbing, often spinose (specially when young). *Leaves* alternate, usually entire, short petiolate; lateral nerves prominent, more or less parallel; stipules early deciduous. *Flowers* small, monœcious or diœcious, 5-merous, sessile or nearly so, in axillary clusters or short spikes; bracts small, scale-like. *Calyx-segments* valvate, persistent. *Petal* 5, small, alternating with calyx segments. *Disk* flat in male flowers with an annular rim, extra staminal in the female flowers, double, outer annular, inner corona-like, enclosing the ovary. *Stamens* 5, united at the base forming an androphore; anther cells parallel; pistillode 2-4-lobed or partite. *Ovary* 2-celled; ovules 2 in

each cell; style 2, free or sub-connate; stigma forked or sub-entire. *Fruit* drupaceous, with 1-2 single seeded pyrenes; albumen fleshy, copious; cotyledons thin; radicle superior.

Erect trees or shrubs :—

Lateral nerves many, usually 12-30 on either half :—

Flower clusters in paniculate spikes :—

Branchlets not verrucose :—

Young stem spinescent. .. 1. *B. retusa*.

Flowers in dense small axillary clusters :—

Fruit ellipsoid, about .25 in. long :—

Branchlets verrucose, not spinescent. 2. *B. verrucosa*.

Flowers in minute axillary clusters :—

Fruit ovoid, about 1 in. long :—

Lateral nerves slightly arching. .. 3. *B. assamica*.

Lateral nerves 5-12 on either half :—

Leaves hairy beneath :—

Fruit ovoid, about .5 in. long :—

Petiole .25 in. long. .. 4. *B. pubescens*.

Fruit globose, .1-1.5 in. across :—

Petiole .12 in. long. .. 5. *B. tomentosa*.

Lateral nerves 6-10 on either half :—

Leaves up to 3.5 in. long. .. 6. *B. cuneata*.

Lateral nerves 10-15 on either half :—

Leaves up to 9.5 in. long. .. 7. *B. sikkimensis*.

Scandent or climbing shrubs, tomentose. .. 8. *B. stipularis*.

1. *Bridelia retusa* Spreng. Vern. *Khasi*, Garo; *Kunhir*, *Kuhir*, Ass.; *Turtung-arong*, Mik.; *Kata-kusi*, Mech.; *Thijigrey-phang*, Kach.; *Dieng-rishan*, Kh.

A large or medium-sized deciduous tree (60'/48''), armed with strong conical spines (up to 2 in. long), when young. *Bark* darkish-grey, rough outside, exfoliating in irregular flakes, about .5 in. thick; inside light red, finely fibrous and soft with faint streaks of lighter tissue. *Leaves* variable, 2.5-8 by 1.5 in., (occasionally up to 12'') elliptic, elliptic-lanceolate, ovate or obovate, acute or obtuse, entire or slightly crenulate, rigidly coriaceous, dark-green and glabrous above, glaucous but pubescent on the nerves beneath; lateral nerves 15-30 on either half, sub-parallel, prominent, meeting in a marginal nerve; areoles with minute dots beneath; petiole .1-1.5 in. long, brown-tomentose; stipules small, deciduous, obliquely lanceolate. *Flowers* up

to .2 in. across, greenish yellow, in dense, axillary fascicles or arranged interruptedly on long, flexuous, axillary and terminal spikes which are sometimes paniced bearing both male and female flowers; bracts villous. *Male flowers*: calyx-segments triangular, acute; petals coarsely toothed or lobed. *Female flowers*: pedicels lengthening in fruit; calyx-segments triangular; outer disc annular, inner completely covering the ovary; petals oblong or ovate, entire or undulate; styles 2, free, bifid from about half way. *Drupe* globose, fleshy, .3-.4 in. across, purplish black when fully ripe, edible, supported by the somewhat enlarged calyx.

GOALPARA, GARO HILLS. N. C. HILLS, NOWGONG, KAMRUP, DARRANG, SIBSAGAR, LAKHIMPUR, KHASI & JAINTIA HILLS, (upto 3,000 ft.).

Wood cream coloured to olive brown, very durable, used for house-posts and other building purposes.

Flrs. 5-6. Fr. 10-1.

2. *Bridelia verrucosa* Haines. (Syn. *B. montana* Willd.) Vern. *Gayo*, Nep.

A small or moderate-sized deciduous tree, often a shrub. *Branchlets* pustulate. *Bark* greyish brown. *Leaves* 3-9 by 1.5-4 in., rhombic-obovate, elliptic or elliptic-oblong, usually obtuse, sometimes sub-acute, entire or undulate, coriaceous, glabrous, glossy above, paler beneath; lateral nerves 9-16 on either half, somewhat arched, meeting the marginal nerve; base cuneate, rounded or narrowed; petiole .1-.4 in. long, almost glabrous; stipules deciduous. *Flowers* greenish-yellow, in dense very small axillary clusters; bracts minute, scarious, hairy. *Male flowers* shorter than the females; calyx-segments oblanceolate; petals obovate, irregularly toothed or lobed. *Female flowers* about 1 in. across; calyx-tube hairy at the base; calyx-segments lanceolate, acuminate; petals oblanceolate, entire; inner disc almost embracing the ovary. *Fruit* ovoid or ellipsoid, .25 in. across, seated on the unaltered calyx, usually black when ripe.

KHASI HILLS, DARRANG, KAMRUP. (upto 4,000 ft.)

There are specimens in the herbarium showing flowering in cold

season which is supported by Mr. P. C. Kanjilal in his Forest Flora for Pilibhit, etc.

Flrs. 4-5. Fr. End of Rainy season.

3. *Bridelia assamica* Hk. f. Vern. *Barhaita*, Ass.

A small tree; branchlets smooth, sparsely pubescent. *Bark* whitish, thin; blaze reddish; wood white. *Leaves* 3-14 by 1·3-5·5 in., elliptic or elliptic-lanceolate or elliptic-oblong, acuminate, entire or undulate, membranous but tough, glabrous, green above, pale beneath, sometimes microscopically puberulous on the nerves beneath; lateral nerves 10-20 on either half, somewhat arched; reticulation elegant; base acute or rounded; petiole ·2-1 in. long; stipules subulate. *Flowers* sessile in minute axillary clusters, about ·25 in.; bracts minute, pubescent, imbricate. *Calyx-segments* ovate-lanceolate. *Male* petals rounded, crenate. *Female* petals elliptic, entire; disc truncate, almost enclosing the ovary; style 2, bifid. *Fruit* ovoid, about 1 in. long, smooth, seated on the unaltered calyx.

SIBSAGAR, NOWGONG, SYLHET, MISHMI HILLS.

Flrs. & Fr. Cold season.

4. *Bridelia pubescens* Kurz. Vern. *Dieng-chehhi*, *Dieng-shih*, Synt.; *Dieng-soh-mantan*, *Raishan-kynthai*, Kh.; *Gayo*, Nep.

A middle-sized tree (40'/30"). *Bark* greyish, finely fissured, ·12 in. thick; reddish inside with scattered fine white fibres; base of stem or young shoot often spinous; branchlets tubercled; twigs pubescent; blaze red, giving out watery juice; wood cream-coloured or slightly yellowish. *Leaves* bifarious, 1-8 by ·5-5 in., elliptic or obovate, undulate or repand, acuminate, membranous, glabrous or puberulous above, pubescent on the nerves beneath; lateral nerves 8-12 on either half, arching; base rounded or acute; petiole ·1-·3 in. long. *Flowers* up to ·25 in. across, tomentose, in axillary clusters or spicate; bracts short. *Calyx* ·12 in. across; segments deltoid, acuminate. *Petals* obovate or obcordate. *Disc*

prominent. *Drupe* ellipsoid or oblong, .5 by .25 in., red when ripe, one-seeded, seated on the calyx.

LAKHIMPUR, NOWGONG, GOALPARA, KHASI & JAINTIA HILLS. (upto 5,000 ft.)

Flrs. 4. Fr. 8-10. (ripe fruit 12-2).

5. *Bridelia tomentosa* Bl. Vern. *Pat-kunhi*, *Mor-kunhi*, Ass.; *Khasi-dubret*, Garo; *Phak-tel*, Kuki; *Sikhreti*, Kamrup; *Dieng-soh-puet-paroa-synrang*, Kh.; *Thebihi-arong*, Mik.; *Thai-dau-blib*, Kach.

A shrub or a small tree (30'/20'); twigs rusty-tomentose. *Bark* greyish-warty, .12 in. thick; inside red, fibrous. *Leaves* 1-4.5 by .5-1.5 in., lanceolate or elliptic, undulate, acute or obtuse, rarely subacuminate, membranous, glabrous or obscurely pubescent above, pale glaucous beneath, (glabrous when mature); lateral nerves 7-12 on either half; base acute or obtuse; stipules .1-.2 in. long, pubescent (always). *Flowers* in axillary clusters; bracts minute, villous. *Male flowers*: shortly pedicelled; petal crenate, broader than long. *Female flowers*: shortly pedicelled; calyx about .11 in. across in fruit; segments triangular; petals suborbicular, entire. *Drupe* .25 in. across, blue-black. globose, seated on the calyx.

SIBSAGAR, NOWGONG, KAMRUP, DARRANG, GOALPARA, GARO HILLS, CACHAR (N. C. HILLS) KHASI & JAINTIA HILLS.

Flrs. 9-10. Fr. 11-1.

6. *Bridelia cuneata* Gehrm.

Tree or shrub. *Leaves* 2-3.5 by 1.5-2.5 in., broadly obovate, glabrescent; secondary nerves 6-10 on either half, often pale underneath; base cuneate; petiole .2 in. long, glabrescent, rugose at the base. *Flowers* in axillary glomerules, glabrous, .1 in. across; peduncles .1-.12 in. long.

KHASI HILLS (Clarke Nos. 40112, 44066, 42604) (allied to *B. Hamiltoniana*).

7. *Bridelia sikkimensis* Gehrm.

Shrub or tree. *Branches* glabriusculus, often lenticellate, verrucose. *Leaves* 2.5-9.5 by 1.5-2.8 in., obovate, apex

rotund or abruptly and shortly cuneate, often pale beneath; secondary nerves 10-15 on either half; petiole .2 in. long, glabrescent, rugose beneath. *Flowers* in axillary glomerules, glabrous. *Calyx-segments* triangular, acute. *Petal* calycine, short. *Fruit* ellipsoid, bilocular or unilocular by abortion; embryo plane, membranous.

KHASI HILLS (Hooker, Clarke). (Engler 1908 p. 34).

8. *Bridelia stipularis* Bl. Vern. *Sepaph-phang*, Kach.; *Lata-mendi*, *Hom-homali*, Darrang, *U-mei-tong-krong*, *Risan-um*, Kh.; *Pat-khowai*, Sylh. *Thebhi-arong*, Mik.; *Phak-tel-lien*, Kuki; *Sagal-lederi*, *Mouhilika*, Ass.

A large more or less scrambling or climbing shrub; branchlets pubescent or tomentose, pendent; stem woody. *Bark* whitish, thin, rough; blaze reddish. *Leaves* 1.3-5 by .7-3 in., (reduced in the flowering twigs) elliptic-oblong or obovate, obtuse or rounded, membranous, glabrate above, tomentose beneath; lateral nerves 8-12 on either half, arching; tertiaries conspicuous, parallel; base rounded or subcordate; petiole .1-.2 in. long. *Flowers* .25 in. across, monœcious, greenish, in numerous axillary clusters, spicate or paniced; bracts broader than long, hirsute. *Calyx-segments* triangular, acute, spreading, with a few brownish spots outside. *Petals* orbicular, cuneate, usually 2 or 3-toothed. *Stamens* at first combined into a column, then branching into 5 spreading arms. *Stigma* just protruding in the centre from the extremity of the column. *Disc* flat, greenish-yellow. *Drupe* oblong, .5 in. long, reddish, turning blue-black when over-ripe, seated on the enlarged calyx.

Common throughout the Province (upto 1,500 ft.).

Fruits are eaten, tastes like *Emblica officianalis*. Wood is used in making stands of baskets.

Flrs. 9-11. Fr. 2-3.

4. CLEISTANTHUS Hk. f.

***Cleistanthus chartaceus* Muell. Arg.**

A small tree (30'/20"); young parts rusty-tomentose. *Bark* cinnamon-grey, fairly smooth, .1 in. thick; inside

salmon red, finely fibrous. *Leaves* alternate, 5-8 by 1·75-2·25 in., narrow-lanceolate or elliptic-lanceolate, acuminate, entire, sub-coriaceous, glabrous, pale grey beneath; lateral nerves 6-8 on either half, sub-parallel, arching; base narrowed into the petiole or acute; petiole ·2·4 in. long. *Flowers* small, monœcious. *Male flowers*: calyx-segments 5, valvate; petals 5, short, scale-like; filaments connate below in a central column bearing the pistillode; anther-cells parallel. *Female flowers*: calyx cupular under the ovary; *disk* dentate. *Ovary* quite glabrous, 3-celled; styles 3, bifid. *Capsule* stipitate, ·5 in. long, woody, of three 2-valved, 1-seeded cocci. *Seeds* albuminous.

KHASI & JAINTIA HILLS, SYLHET.

Flrs. 3. Fr. 5.

5. ACTEPHILA Bl.

Actephila excelsa (Dalz) Pax & Hoffm. Syn. *Actephila excelsa* Muell. Arg.

A small tree or shrub; young shoots minutely hairy. *Bark* grey. *Leaves* 2-9 by ·8-3 in., obovate or oblanceolate or oblong-elliptic, acuminate, entire, sub-coriaceous, glabrous; lateral nerves 6-12 on either half; base cuneate or acute; petiole ·2·6 in. long. *Flowers* in axillary clusters; sepals 5-6; petals small; *disc* 5-lobed. *Stamens* 3-6; filaments connate or free, round a 3-lobed pistillode. *Fruit* capsular, depressed, globose, 1 in. across, 3-angled, usually on a slender pedicel up to 4 in. long.

SIBSAGAR, N. C. HILLS, NOWGONG, KHASI & JAINTIA HILLS, (upto 4,000 ft.).

Flrs. 9. Fr. 12-1.

6. ANDRACHNE Linn.

Herbs or undershrubs. *Leaves* usually alternate, entire, membranous. *Flowers* monœcious, pedicelled. *Male flowers* clustered; calyx 5-6-lobed or partite; petals 5-6 or obsolete; stamens 5-6; anthers erect; cells parallel; pistillode small. *Female flowers*: calyx large; petals almost obsolete. *Ovary* 3-celled; styles 2-fid or partite. *Capsule* of 2-3-valved cocci.

Seeds curved, rugose, not strophiolate; albumen fleshy; embryo curved; cotyledons broad, flat.

Leaves oblong or elliptic-obtuse; style 3.

deeply bifid. 1. *A. cordifolia*.

Leaves lanceolate-acuminate; style 4-6 .. 2. *A. emicans.*

1. *Andrachne cordifolia* Muell. Arg.

A small shrub with slender branches; young parts hairy. *Leaves* 1-3 by .7-1.2 in., ovate-oblong or elliptic, obtuse, entire, thinly membranous, glabrous, pale and sparsely puberulous beneath; lateral nerves slender, almost obscure; base rounded or acute; petiole slender, .2-.7 in. long. *Flowers* monœcious, on long filiform pedicels, .5-1.5 in. long. *Calyx-segments* obovate. *Petals* keeled; disc of 5 bifid glands. *Ovary* 3-celled; ovules 2 in each cell; styles 3, deeply bifid. *Capsule* globose, .3 in. across, slightly 3-lobed, supported by the accrescent calyx.

KHASI & JAINTIA HILLS, N. E. F. TRACT, GOALPARA.

Flrs. 6-9. Fr. Cold season.

2. *Andrachne emicans* Dunn.

A small shrub; the young shoots springing up to a height of 10 feet, which is a prominent feature of the plant. *Leaves* 2·3-3·5 in. long, lanceolate-acuminate, dark green; lateral nerves 8-9 on either half; base acute; petiole slender, ·4-·8 in. long. *Female flowers* axillary, 2-4; pedicels slender, ·3-·4 in. long. *Calyx-segments* ovate-obtuse, herbaceous, ·07 in. long. *Disc glands* alternate with the calyx-segments, ·02 in. long, membranous, deeply bilobed. *Ovary* trilocular, 6 ovulate; style 4-6, ·02 in. long. *Capsule* depressed, globose, about ·02 in. across. *Seeds* 6, angulate, ·06 in. long.

N. E. F. TRACT, (Kobo) (Burkill's Nos. 35955, 37068, 37390).
Fr. 12.

A. Clarkei *Hk. f.*

A slender erect shrub 18 ft. high.

(F. B. I. P. 285, Vol. V).

Kohima (4,700 ft. Clarke), MANIPUR.

(There is no specimen in Forest Herbarium, Shillong).

7. NEOPELTANDRA Gamble.

Undershrub. *Leaves* alternate, membranous; stipules caducous; ciliate. *Flowers* monœcious; male in short racemes covered with ciliate imbricating bracts; female solitary from below them, long-pedicelled. *Calyx-segments* 5, imbricate. *Disc* saucer-like, lining the inside of the calyx. *Stamens* 5; filaments connate below, free above; anthers 2-celled, dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell, pendulous; styles 3-fid. *Capsule* small, 3-celled, cocci thinly coriaceous. *Seeds* 2 or only 1 in each cell; testa crustaceous, prominently pitted; albumen fleshy; cotyledons flat, leafy.

Neopeltandra macropus (Hk. f.) A. Das. (Syn. *Phyllanthus macropus* Hk. f.)

Shrubby, quite glabrous, similar to *P. longipes* Muell. in habit. *Leaves* 3-5 in. long, ovate or oblong-lanceolate, finely acuminate, undulate, membranous; petiole 1-3 in. long. *Female flowers* axillary; pedicels very long. *Capsule* small, hairy.

MISHMI HILLS (Griffith—4811). (F.B.I., P. 287, Vol. V).
(There is no specimen in Sibpur or in Forest Herbarium, Shillong).¹

8. PHYLLANTHUS Linn.

Herbs or shrubs, usually deciduous, sometimes with deciduous branchlets. *Leaves* entire, alternate, distichous. *Flowers* very small, monœcious, in axillary cluster or subsolitary. *Female flowers* larger. *Calyx-segments* 5-6, imbricate in 2 series, accrescent in fruit. *Petals* 0. *Disc* in male of small glands in female of glands or annular. *Stamens* 3; filaments connate or free; anthers confluent or didymous, dehiscing vertically or transversely. *Ovary* 3-celled; styles 3, free or connate at base, 2-fid. *Fruit* capsular, with three thin or crustaceous 2-valved cocci. *Seed* trigonous, 2 in each cell, rounded at the back; albumen fleshy.

Anthers erect, acute; slits vertical; connective usually produced :—

Stamens 3 :—

Sepals 5-6 in both sexes :—

Leaves 2·5-4 in. long, ovate-lanceolate, glabrous; stipules minute. 1. *P. bæobatryoides*.
 Anthers didymous or reniform; slits very short :—

Stamens 3 :—

Sepals 5-6 in both sexes :—

Flowers axillary, generally clustered on leafy branchlets :—

Leaves less than 1·25 in. long, glabrous :—

Stipules peltate :—

Leaves elliptic-lanceolate :—

Capsule about ·12 in. across. 2. *P. Griffithii*.

Stipules hastate :—

Leaves elliptic or elliptic-oblong :—

Capsule about ·25 in. across. 3. *P. parvifolius*.

Stipules broadly peltate :—

Leaves coriaceous, linear-lanceolate :—

Capsule ·1 in. across. .. 4. *P. Ræperianus*.

Stipules semi-sagittate :—

Leaves obovate-oblong :—

Capsule ·1 in. across. .. 5. *P. simplex*.

Stipules lanceolate :—

Leaves elliptic-oblong, membranous :—

Capsule about ·09 in. across. 6. *P. Leschenaultii*.

Stipules membranous, fimbriate :—

Leaves obovate or obcordate :—

Branchlets grooved :—

Disc of female-flowers obscurely lobed. 7. *P. Clarkei*.

Leaves elliptic or obovate-oblong :—

Disc of female-flowers deeply 6-lobed. 8. *P. brevipes*.

1. *Phyllanthus bæobatryoides* Wall.

A glabrous shrub; branchlets woody. *Leaves* 2·5-4 by 1·1-5 in., ovate-lanceolate or oblong-lanceolate, acute or acuminate, rather thinly coriaceous, glabrous; lateral nerves 6-8 on either half, slender; leaves sessile or almost sessile; stipules minute. *Flowers* usually clustered in slender axillary spikes or racemes, about 3 ft. long; bract minute; male flowers shortly pedicelled; sepals 5-6, orbicular; disk of 5-6 glands; female flowers subsessile, larger; sepals narrow-

er, oblong-lanceolate; disk obscure. *Stamens* 3, apiculate, not diverging at the apex. *Ovary* 3-celled, 2 ovules in each cell; style short; stigma 3, armed, blunt. *Fruit* capsule.

KHASI & JAINTIA HILLS, (16417), SYLHET (Wallich, Griffith).

Flrs. 2. Fr. Hot season.

2. *Phyllanthus Griffithii* Muell.

A much-branched shrub or under-shrub; branchlets angled, glabrous. *Leaves* subsessile, .5-.8 in. long, scattered, elliptic or oblong, acute or obtuse, sub-coriaceous, glaucous beneath; lateral nerves 6-8 on either half; stipules peltate, lacerated; base acute. *Flowers* axillary; pedicels long. *Male flowers* .06 in. across; pedicels slender; sepals rounded; stamens recurved; anthers globose; disk of small glands. *Female flowers* larger; sepals oblong, reflexed in fruit; ovary globose; style arms capillary; disc annular. *Capsule* .13 in. across; depressed-globose.

Mamloo (K. & J. Hills), MANIPUR. (F.B.I. V. P. 224).

3. *Phyllanthus parvifolius* Ham. Vern. *Tew-khap-nip*, *Ja-la-mat-kha*, Kh.

A virgate shrub 4-8 ft. high, with slender upright branches, almost glabrous, ribbed, twigs purplish. *Bark* pale-brownish. *Leaves* bifarious, .2-.3 by .1-.2 in., sessile, obovate or elliptic, rounded, entire, membranous, glaucous beneath; lateral nerves 4-5 on either half; stipules hastate. *Flowers* .1 in. across, minute, axillary, pedicelled, solitary or few together. *Male flowers*: calyx-segments rounded; filaments short, spreading; anthers didymous; disc glandular. *Female flowers*: calyx-segments oblong; disc annular; ovary globose; styles 2-partite. *Capsule* about .15 in. across, globose, obscurely 3-lobed, purplish. *Seeds* smooth.

KHASI & JAINTIA HILLS, (4-5,000 ft.).

Flrs. 6-9. Fr. Cold season.

4. *Phyllanthus Rœperianus* Wall.

A small rigid shrub; branches densely fascicled, woody; branchlets ribbed. *Leaves* dense, $\cdot 2\cdot 6$ by $\cdot 1\cdot 2$ in., linear, oblong-lanceolate or obovate, obtuse or acute, margin recurved, coriaceous, pale green above, glaucous beneath; lateral nerves 4-6 on either half, rather obscure; base rounded or sub-cordate; petiole $\cdot 1$ in. long; stipules membranous, peltate. *Flowers* dull white, arising from tufts of minute fimbriate bracts. *Male flowers* very shortly pedicelled; calyx-segments 5-6, broadly oblong, fertile. *Stamens* 3; filaments connate to the middle; anthers didymous; disc glandular. *Female flowers* larger; disc broad, 6-lobed; style reflexed, 2-partite, slender. *Capsule* $\cdot 12$ in. across, depressed globose, crustaceous, obscurely 3-lobed.

MANIPUR, KHASI & JAINTIA HILLS, (5-6,000 ft.) on rocks along streams.

Flrs. 3-4. Fr. 9-10.

5. *Phyllanthus simplex* Retz. Vern. *Bon-Baberi*, Ass.

An annular or an undershrub, about 2 ft. high, glabrous; branches somewhat flattened, ridged from the leaf bases. *Leaves* variable, distichous, almost sessile, $\cdot 5\cdot 1\cdot 5$ by $\cdot 3\cdot 7$ in., linear-oblong, apiculate or rounded, entire, slightly recurved, thinly coriaceous, glabrous, glaucous beneath; lateral nerves 4-5 on either half; stipules broadly auricled or peltate. *Flowers* minute, in small clusters or solitary; pedicels slender, longer in female flowers. *Calyx-segments* 6, oblong, obtuse in female, slightly accrescent in fruit; stamens 3, free; anthers didymous. *Disc* glandular in male, auricled in female. *Ovary* minutely verrucose when young, obscurely 6-lobed; styles 2-fid; arms recurved. *Capsule* $\cdot 1$ in. across, globose, smooth, crustaceous. *Seeds* minutely tubercled in rows.

KAMRUP.

The leaves, flowers and fruits are used medicinally.

Flrs. & Fr. most of the year; mainly in rainy season.

6. *Phyllanthus leschenaultii* Muell.

A small shrub 2-4 ft., much branched and with numerous short fascicled deciduous branchlets. *Leaves* distichous,

·5-1·2 by ·3-·6 in., elliptic or elliptic-oblong, obtuse or subacute, membranous, glabrous; lateral nerves 4-8 on either half, very slender; base rounded or acute; petiole very slender, ·07-1 in. long; stipules about ·4 in. long, lanceolate. *Flowers* minute, male and female often from the same axils; pedicels filiform, ·16-·25 in. long. *Male*-perianth of 6 nearly free petaloid segments, whitish, elliptic-oblong, acute; disc of 6 orbicular glands; anthers terminal, didymous; cells confluent. *Female* perianth similar to male; disc annular, fleshy, lobed or crenate; style 3, spreading, dividing into 2 linear lobes. *Capsule* ·12 in. across, sub-globose.

KHASI HILLS, (2-5,000 ft.).

Flrs. & Fr. 6-8. (Haines).

7. *Phyllanthus Clarkei* Hk. f. Vern. *Soh-sa-kuriau*, Kh.

A rigid small shrub 2-3 ft. high, woody; branchlets grooved, scaberulous, stiff, erect. *Leaves* ·2-·5 by ·1-·2 in., obovate, rounded or acute, margins recurved, rather thinly coriaceous, green above, paler beneath; lateral nerves 3-4 on either half, very slender, rather obscure; base narrowed into the short petiole which is ·1 in. long; stipules fimbriate, membranous, *Flowers* sub-solitary; pedicels filiform, about ·3 in. long; calyx-segments broadly oblong; disc of male glandular, that of female cupular, obscurely lobed; filaments short, recurved; anthers didymous. *Ovary* globose; style free, reflexed. *Capsule* globose, reddish, about ·12 in. across, obscurely 6-lobed, smooth.

N. E. F. TRACT, KHASI HILLS, (6,000 ft.). Along streams.

Flrs. & Fr. 10-1.

8. *Phyllanthus brevipes* Hk. f.

Shrubby, about 18 in. high, quite glabrous; branches rigid. *Bark* greyish-brown. *Leaves* ·3-·9 by ·2-·4 in., elliptic, obovate or oblong, obtuse or subacute, entire, thinly coriaceous; lateral nerves 4-6 on either half, very slender; base cuneate or acute; petiole very short, ·05-·1 in. long. *Flowers* arising from tufts of fimbriate bracts. *Male flowers* ochre-

green; sepals broadly obovate; disc of orbicular glands; filaments connate at base; anthers didymous. *Female flowers* green; sepals narrower; disc deeply lobed; style reflexed, 2-lobed. *Capsule* sub-globose, 3-lobed, .05-.8 in. across.

N. E. F. TRACT (Burkill's No. 37,147) MISHMI HILLS.
(Griffith 4,821).

Flrs. 12.

P. nanus *Hk. f.*

A rigid perennial, rather woody, glabrous. *Leaves* .1-.4 by .1 in., sub-sessile, linear, obovate-oblong, obtuse; margins recurved, coriaceous. *Flowers* minute. *Calyx* segments ovate. *Capsule* globose.

Laitlyngkot—KHASHI HILLS, 6,000 ft. (Sister Dagmar No. 7741).

Flrs. & Fr. 9.

P. urinaria *Linn.*

An annual herb (rarely perennial); branchlets angled. *Leaves* sessile, .16-.6 in. long, very variable, oblong or linear-oblong, apiculate or rounded, glaucous beneath; stipule peltate. *Flowers* minute, axillary; sepals ciliolate. *Filaments* short, free. *Ovary* granulate. *Fruit* .1 in. across, echinate.

ASSAM.

Var. Hookeri.—Taller and larger; stem and branches terete.

KHASHI & JAINTIA HILLS, (2-4,000 ft.). (Griffith).

P. debilis *Ham.*

Rather an undershrub. *Leaves* .3-.5 by .2-.3 in., obovate, membranous. *Anther* didymous. *Styles* short; arms reflexed, recurved. *Capsule* very small; seeds ribbed.

KHASHI & JAINTIA HILLS (Umsaw).

Flrs. 7.

9. REIDIA Wight.

Herbs, shrubs or undershrubs. *Leaves* alternate, various, usually membranous; stipules small. *Flowers* monœcious in fascicles; male short, pedicelled; female long pedicelled. *Calyx-segments* 4 in male, 6 in female, persistent. *Corolla* obsolete. *Disc* 4-glandular in male and 6-glandular in female. *Stamens* 2-4; the filaments united in a column round the pistillode; anthers dehiscing horizontally. *Ovary* 3-celled; ovules 2 in each cell; style 3, 2-fid or 2-partite.

Capsule of 3 thinly crustaceous 2-valved cocci. *Seeds* triangular; cotyledons oblong.

Leaves up to 1·5 in. long, elliptic or broadly ovate :—

Calyx of male and female flowers fimbriate :—

Fruit ·16 in. across, depressed. .. 1. *R. Hamiltoniana*.

Leaves upto 3·5 in. long, lanceolate :—

Calyx of male pectinately fimbriate, of female serrate :—

Fruit ·25 in. across; globose. .. 2. *R. tetrandra*.

1. *Reidia Hamiltoniana* (Muell). Cowan. (Syn. *Phyllanthus Hamiltonianus* Muell). Vern. *Moyra-tikoni*, Ass.

A small shrub, bushy; branchlets puberulous, slender, purplish-brown. *Leaves* ·8-2 by ·4-1 in., elliptic-obovate or ovate, obtuse or acute, membranous, green above, pale beneath, glabrous; lateral nerves 6-8 on either half, very slender, rather obscure; base usually rounded; petiole ·05-·1 in. long; stipules ovate, caducous. *Male flowers* in axillary fascicles; pedicels capillary, about ·5 in. long. *Female flowers* axillary, solitary or in terminal lax racemes; pedicels capillary, about 1 in. long; calyx-segments pubescent without, male 4, female 6, more or less toothed; male disc dilated, 4-lobed; female disc saucer-shaped. *Ovary* 4-celled; style 4, erect. *Fruit* globose, scabrid, ·16 in. across.

KAMRUP (supposed to occur in NOWGONG, GOALPARA and KHASI HILLS).

Flrs. & Fr. 4-5.

2. *Reidia tetrandra* (Roxb) A Das Comb. (Syn. *Phyllanthus Roxburghii* Muell).

Shrubby; branches slender, terete, rusty-pubescent. *Leaves* 2-3·5 by ·9-1·5 in., often inequilateral, lanceolate, acute or bluntly acuminate, entire, membranous glabrous; lateral nerves 6-10 on either half, very slender; base rounded or obtuse; petiole ·07-1 in. long; stipules caducous, sub-

late. *Flowers* red, densely fascicled; pedicels up to .5 in. long, very slender or capillary. *Male* perianth segments pectinately fimbriate; disc glands 2-lobed. *Ovary* smooth. *Fruit* deeply 3-lobed, .25 in. across; cocci thinly crustaceous.

SYLHET.

10. PROSORUS Dalz.

Trees. *Leaves* alternate, deciduous. *Flowers* diœcious; male monœcious in axillary fascicles, with capillary pedicels; female solitary or few together, axillary, with stouter and longer pedicels. *Calyx-segments* 4. *Disc* annular, fleshy. *Stamens* 4; filaments free; anthers extrorse; cells dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell; style shortly bifid. *Capsule* globose; epicarp thin; seeds 6, irregularly trigonous, arillate; albumen coarse; cotyledons small, flat.

Prosorus indicus (Muell) Dalz. (Syn. *Phyllanthus indicus* Muell). Vern. *Gunamala*, *Tukora*, Ass.; *Yogirasing*, Miri; *Sikat-liupi-asing*, Abor; *Pong-ser-baphang*, *Thai-jigre-buphang*, Kach.; *Phong-arong*, *Nalong*, Mik.; *Theipuithing*, Kuki; *Heiru*, Manip.; *Nagaratijam*, Cach.; *Bajardanti*, Hind.; *Mota-pojial*, Sibsagar.

A large or moderate sized tree (60'/53"). *Bark* greyish-brown, smooth, exfoliating in large papery flakes, .25 in. thick, pinkish inside, soft; branchlets purplish brown. *Leaves* distichous, 2-6 by 1.5-3 in., elliptic or oblong-elliptic, acute or rounded, usually entire, thinly coriaceous, glabrous; lateral nerves 8-12 on either half; base rounded or acute; petiole .2-.3 in. long; stipules lanceolate, serrate. *Male flowers* in axillary fascicles; pedicels capillary, short; calyx-segments 4-5; stamens 4; filaments free; anthers adnate; disc large, annular, fleshy. *Female flowers* axillary, solitary or fascicled; pedicels .5-.8 in. long, stouter than male; disc small, narrow; ovary 3-celled; ovules 2 in each cell; style bifid with recurved lobes. *Fruit* spherical, depressed, .4 in. across, purplish brown, rugose, smooth, obscurely 6-lobed, cocci white. *Seeds* obscurely trigonous, deeply purplish-blue.

LAKHIMPUR, SIBSAGAR, NOWGONG, N. E. F. TRACT,
CACHAR, SYLHET.

Flrs. 4-5. Fr. Cold season.

11. FLUEGGEOPSIS K. Schum.

Shrub. *Leaves* distichous, shortly petioled. *Flowers* diœcious, pedicelled. *Calyx-segments* of male and female 5-6, broadly oblong. *Disk* of male consisting of a globose gland, of female consisting of an obscure ring. *Stamens* 5; filaments free; anthers erect; slits vertical; connectives not produced. *Ovary* 3-celled, ovoid; styles 3, slender, entire, united at the base. *Fruit* a 3-seeded berry; testa crustaceous.

Flueggeopsis glauca (Wall) A. Das, n. comb. (Syn. *Phyllanthus glaucus* Wall) Vern *Dieng soh-matan* Kh.

A shrub, quite glabrous; branches divaricate; branchlets slender. *Bark* greyish, rather rough, green below the cuticle; blaze whitish. *Leaves* .5-2 by .3-1 in., elliptic or oblong, acute, obtuse or shortly acuminate, membranous, glaucous beneath; lateral nerves 5-10 on either half; base acute; petiole .05-.1 in. long. *Flowers* yellowish, about .1 in. across, axillary, solitary or fascicled. *Male flowers*: calyx-segments lanceolate. *Stamens* 5, free. *Female flowers*: pedicel clavate, .2-.4 in. long. *Fruit* globose, purplish, .2-.4 in. across, covered with the persistent style.

KHASI HILLS (4-5,000 ft.).

Flrs. 4. Fr. 6-7.

12. KIRGANELIA Baill.

Shrubs, straggling. *Leaves* alternate; stipules lanceolate. *Flowers* monœcious, in axillary clusters (male and female mixed). *Calyx* segments 5, imbricate, the 3 inner often the larger. *Petals* obsolete. *Disk* of 5 fleshy glands. *Stamens* 5 in 2 series, the outer free, the inner connate; anthers dehiscing longitudinally. *Ovary* 5-12 celled; ovules 2 in each cell, superposed; albumen fleshy; cotyledons flat, truncate.

Kirganelia reticulata (Poir) Baill. (Syn. *Phyllanthus reticulatus* Poir).

A large straggling or scrambling shrub; branches slender, pendent, lenticellate; stem often spinescent. *Bark* greyish; purplish on old stem, warty, sometimes reticulately fissured; blaze reddish. *Leaves* distichous, .5-2 by .3-1 in., ovate-oblong or elliptic, rounded, obtuse or acute, entire, membranous, glabrous, dark green above, pale and canescent beneath; lateral nerves 6-10 on either half, slender, arching; base rounded or sub-cordate; petiole .05-.15 in. long; stipules hard, brown. *Flowers* axillary, solitary or in few-flowered fascicles. *Calyx-segments* ovate, membranous, 5-6 in both sexes. *Disc* glandular. *Stamens* 5, 3 inner longer, connate; anthers erect; slit vertical. *Ovary* globose, 4-8 celled; ovules 2 in each cell, superposed; style minute, bifid. *Berry* purplish, .12-.16 in. across, rather depressed. *Seeds* triquetrous; testa crustaceous, granulate.

DARRANG, GOALPARA, GARO HILLS, KHASI & JAINTIA HILLS (5-6,000 ft.).

Flrs. 12-3. Fr. 3-6.

13. EMBLICA Gærtn.

Trees; branchlets distichous. *Leaves* small, pinnately arranged on the branchlets; stipules scarious, minute. *Flowers* monœcious, axillary, fascicled, male and female mixed or frequently male in upper and female in lower axils. *Calyx-segments* 5-6. *Stamens* 3; filaments connate in a column, anthers cohering by the connective, ending in an apiculus; cells dehiscing longitudinally. *Ovary* 3-celled; ovules 2 in each cell; styles connate at base with recurved twice branched arms. *Fruit* globose, fleshy, with 3 bony 2-valved cocci. *Seeds* trigonous; albumen fleshy; cotyledons flat, broad, cordate or truncate.

Embllica officinalis Gærtn. (Syn. *Phyllanthus Embllica* Linn.) The Emblic Myrobolan. Sans. *Amluki*, Vern. *Aonla*, *Eola*, *Awla*, Beng.; *Gulian-tenga* or *Amalaki*, Ass.

A small to medium sized tree, deciduous; branchlets feathery with distichous leaves, resembling a pinnate leaf.

Bark greyish or light brownish, exfoliating in irregular plates; blaze pinkish brown to reddish, green at the edge, .25-.5 in. thick. *Leaves* .2-.5 by .1-.15 in., subsessile, paler beneath, glabrous; stipules minute, scarious, deciduous. *Flowers* yellowish, monoëcious in axillary clusters, usually crowded towards the lower naked portion of the branchlets. *Male flowers*: perianth 6, imbricate, ovate-oblong; pedicels upto .15 in. long; stamens 3, joined in a short column; anthers longitudinally dehiscent; disk obscure or of glands. *Female flowers* subsessile; perianth similar to male flowers; disk cupular, irregularly toothed; ovary 3-celled; ovules 2 in each cell; styles bifid, spreading. *Fruit* a drupe, globose, .5-.8 in. across, obscurely 6-lobed, yellowish on ripening, stone splitting into 2-seeded bony cocci when dry; seeds trigonous.

All over the Province, sometimes cultivated (Fruit is often larger in cultivation).

The fruit is edible and made into *chutney* or preserved with sugar.

The bark and fruit are used for tanning. "This *Emblie Myrobolan* is an important article in Hindu Materia Medica." "A fermented liquor prepared from the fruit is used in jaundice, dyspepsia, cough, etc."

Astringent, demulcent and tonic. (Watt's Dictionary of the Economic Products of India, p. 219, Vol. VI).

Flrs. 3-5. Fr. Cold season.

14. FLUEGGEA Willd.

Fluggea virosa Baill. (Syn. *Flueggea microcarpa* Bl.) Vern. *Dieng-krong-wait-lam*, Kh., *Khaukura*, Sylh. *Mihoi*, Tipp. *Hukhen-biphang* Mech; *Dumikron*, Garo. *Sugane*, Kach.; *Hatititi*, Miri; *Cheng-cheng-arong*, Mik.; *Masek*, Kuki.

A large unarmed shrub or small tree; branches straggling, angular. *Bark* reddish brown, exfoliating in thin strip, .1-.12 in. thick; inside reddish. *Leaves* deciduous, alternate, distichous, 1-4 by .5-2.5 in., elliptic-ovate, obovate or sub-orbicular, acute or obtuse, rarely acuminate, entire or retuse, membranous but tough; lateral nerves 5-8 on either half, slender; petiole .1-.4 in. long. *Flowers* diëcious, minute, pedicellate, axillary. *Male flowers* in clusters; calyx-segments 5, imbricate, petaloid; petals 0; disc of 5 or less glands,

alternate with the stamens; stamens 5, rarely less; filaments free, exserted; pistillode 2-3 fid. *Female flowers* sub-solitary; disc annular, toothed; ovary 1-3-celled; styles free, recurved, usually bifid. *Fruits* of 2 sizes mostly small and dry, but some large, white, fleshy, .3 in across. *Seeds* triquetrous, minutely punctate; albumen scanty; embryo curved; cotyledons flat.

Fairly common throughout the province (upto 5,000 ft.).

NAGA HILLS, KHASI & JAINTIA HILLS.

Wood reddish, white, closed grained and durable. Used for agricultural implements.

Flrs. 4-5. Fr. 9-11.

15. BACCAUREA Lour.

Baccaurea sapida (Roxb) Muell. Arg. Vern. *Buri*, Miri; *Leteku*, Ass.; *Khushmai-phang*, Kach.; *Dampiyu-arong*, Mik.; *Dieng-soh-ram-dieng*, Kh.; *Bhubi*, Sylh.; *Moktok*, Manip.; *Pangkai*, Lush.; *Aphek*, Kuki; *Iphek*, Tipp.; *Dojuka*, Garo; *Phaduk-jela*, Mech.; *Notko*, Rajbungshi; *Lotka*, Beng.

A middle-sized tree (35'/48''); young parts hairy. *Bark* darkish grey, with vertical lenticels, exfoliating in pieces, .3 in. thick; blaze brownish; wood cream coloured. *Leaves* 4-9 by 1.3-3.5 in., elliptic-oblong or obovate or elliptic-lanceolate, acuminate, membranous, glabrous; lateral nerves 5-10 on either half; base narrowed; petiole .5-1.75 in., thick, geniculate. *Flowers* diœcious, apetalous, shortly pedicellate, in densely fascicled racemes from old wood or below the leaves. *Male bracts* longer than the clusters. *Female bracts* very small. *Calyx-segments* 4-5, unequal. *Stamens* 4-8; filaments short, free; anthers small; pistillode pubescent; disc 0. *Ovary* 2-5-celled, tomentose; stigma small, 2-5; ovules 2 in each cell. *Fruit* globose, capsular, yellowish-brown, about 1 in. across; endocarp not separable. *Seeds* orbicular, embedded in rose-coloured pulp (arillus).

Common throughout the province.

The pulp is edible and delicious.

Flrs. 4-5. Fr. 5-7.

16. APOROSA Blume.

Trees, usually evergreen. *Leaves* alternate, entire, rarely sinuate-toothed, coriaceous; stipules small, rarely large, foliaceous. *Flowers* usually dioecious, apetalous, male minute in axillary catkin-like spikes, solitary or clustered; female in short bracteate spikes; bracts concave, imbricating. *Male flowers* : calyx-segments usually 4, (sometimes 3-6) imbricate, membranous; disk obsolete; stamens 1-5, central; filaments capillary; anthers didymous; pistillode minute or 0. *Female flowers* : sepals longer; ovary 2, rarely 3-celled; ovules 2 in each cell; stigmas small, short, plumose, simple or 2-4 cleft, spreading and recurved, rarely elongate and 2-partite. *Fruit* capsular, ovoid, ellipsoid or globose, bursting irregularly or partially, 2-4-valved from the base; epicarp thin or thick, spongy or fleshy. *Seeds* oblong or sub-orbicular; albumen fleshy; cotyledons flat, broad.

Ovary more or less hairy :—

Fruit ovoid-oblong, nearly glabrous :—

Leaves elliptic or elliptic-lanceolate, acuminate. 1. *A. Roxburghii*.

Fruit ellipsoid, base hairy :—

Leaves elliptic-oblong, obtuse or sub-acute. 2. *A. oblonga*.

Ovary glabrous :—

Fruit ellipsoid, beaked, about .5 in. long, cells of fruit very hairy within :—

Male bracts tomentose :—

Leaves dark-green. 3. *A. Wallichii*.

Fruit globose, .5 in. across, cells of fruit glabrous within :—

Male bracts glabrous :—

Leaves pale green. 4. *A. aurea*.

1. *Aporosa Roxburghii* Baill. Vern. *Samphere*, *Khoi-doi*, Mech; *Chhamolja*, Garo; *Garo-khuta*, Kamrup; *Tamsir-arong*, Mik.; *Khempasi-baphang*, Kach.; *Khokora*, *Bara-heloch*, Ass.; *Tinsibi*, Manip.; *Sontul*, Lush.; *Debaru*, Duff.

An evergreen tree (35'/30''), almost glabrous (except inflorescence and tips of twigs). *Bark* greyish-brown, reticulately fissured, .12-.16 in. thick; inside reddish with brown streaks, finely fibrous; wood cream coloured. *Leaves*

2·5-6·5 by ·8-3 in., elliptic or elliptic-lanceolate, sometimes elliptic-oblong, acuminate, rarely obtuse, entire, sinuately toothed or obscurely crenate, chartaceous, glabrous, sometimes hairy on the nerves beneath; lateral nerves 5-8 on either half; base rounded, cuneate or narrowed into the petiole; petiole ·3-·6 in. long. *Male spikes* often up to 2 in. long, often clustered; bracts broad, ciliate. *Calyx-segments* pubescent. *Ovary* thinly hairy; stigma short, bifid. *Fruit* almost glabrous or sparsely hairy, usually ovoid-oblong with taper or beak at the end, (·3-·5 in. long), arillate; aril reddish, acid; pericarp thin; septum hairy.

Common throughout the province.

Fruit is eaten. Infusion of the leaves is used to dye cloth black. Wood is hard, durable and is used for house posts.

Flrs. Cold Season. Fr. 4-5.

2. *Aporosa oblonga* Muell. Arg. Vern. *Chham-chholja*, Garo.

A tree, glabrous. *Bark* grey, corky outside, with deep longitudinal furrows, ·25 in. thick; inside brownish, fibrous. *Leaves* 3·5-6 by 8-2·2 in., often slightly inequilateral, elliptic-oblong, sometimes ovate-oblong, usually obtuse, entire, coriaceous; lateral nerves 6-8 on either half; base rounded or acute, sometimes sub-cordate; petiole ·3-·7 in. long. *Male spikes* axillary, usually solitary, up to 2·5 in. long. *Female spikes* very short, rusty-pubescent; bracts glabrous, ciliate. *Ovary* glabrous; stigmas cleft, deeply recurved, plumose. *Fruit* ellipsoid, about ·5 by ·3 in., beaked; rusty-pubescent at base.

CACHAR, GARO HILLS, KHASI & JAINTIA HILLS. (up to 3,000 ft.).

Used for house posts.

Flrs. 1. Fr. 3-5.

3. *Aporosa Wallichii* Hk. f. Vern. *Tansil-arong*, Mik.; *Chamcholja*, Garo.

A large tree, glabrous. *Bark* grey, smooth. *Leaves* 2·5-6 by ·6-1·5 in., lanceolate or narrow oblong-lanceolate,

bluntly acuminate, entire, coriaceous, glabrous, dark green; lateral nerves 5-7 on either half, slender; base acute or rounded; petiole .2-.7 in. long. *Male spikes* about 1.5 in. long; sepal 4; stamens 2; bracts tomentose. *Ovary* fusiform, glabrous; stigmas 2-cleft, plumose. *Fruit* ellipsoid, .5 in. long, beaked; cells of fruit very hairy within.

SIBSAGAR, NOWGONG, GARO HILLS.

Flrs. 3. Fr. Early rains.

4. *Aporosa aurea* Hk. f. Vern. *Chhamolia*, Garo; *Dieng-soh-kyrsiu*, Kh. *Garo-khuta*, Ass.; *Sesri*, Sylh.

An evergreen tree, glabrous. *Bark* brown, rough, .12 in. thick; inside reddish, coarsely fibrous. *Leaves* 3-7 by 1-2 in., elliptic-oblong or elliptic-lanceolate, bluntly acuminate, entire, coriaceous, glabrous, pale green (yellowish-green when dry); lateral nerves 5-8 on either half; base acute or rounded; petiole .3-1 in. long. *Male spikes* about 1.5 in. long; usually clustered; male bracts glabrous. *Female spikes* short; anthers exserted. *Ovary* flask-shaped, glabrous; styles long, 2-cleft, fringed. *Fruit* globose, .5 in. across, glabrous; cells of fruit glabrous within.

GARO HILLS, KHASI & JAINTIA HILLS, KAMRUP, (up to 4,000 ft.).

Timber used for house posts. Decoction of leaves is used as a yellow dye.

Flrs. 11. Fr. 1.

17. ANTIDESMA Linn.

Trees or shrubs. *Leaves* alternate, entire, stipulate. *Flowers* bracteate, diœcious, apetalous, in slender lateral or terminal, simple or paniced spikes or racemes. *Calyx*-segments 3-5 (rarely more). *Male flowers* lobed or partite; disc entire, stamens 2-5, inserted on or around the disc; filaments inflexed in bud; anther semi-linear or didymous; cell globose; connective thickened; pistillode glabrous or hairy, clavate or globose, minute or 0. *Female flowers* disc annular or pulvinate; ovary 1-celled; ovules paired; stigma 2-4, 2-fid or 2-partite. *Fruit* a compressed drupe, crowned

with the persistent stigmas. *Seeds* small; albumen fleshy; cotyledons broad, flat.

Ovary pubescent :—

Leaves 1·5-3 in. long :—

Stamens 4-7. 1. *A. Ghesæmbilla*.

Ovary tomentose :—

Leaves 5-9 in. long :—

Stamens 3-4. 2. *A. Roxburghii*.

Ovary glabrous :—

Male flowers sessile :—

Calyx cupular, very shortly 4-lobed.

Leaves 2-6 in. long, glabrous :—

Stamens 3. 3. *A. Bunius*.

Calyx 4 partite :—

Leaves 3·5-7 in. :—

Stamens 4. 4. *A. nigricans*.

Male flowers pedicelled :—

Calyx obtuse, 4-lobed, female calyx deeply 4-lobed :—

Leaves 1-5 in. long :—

Stamens 2 (very rarely 3). .. 5. *A. diandrum*.

Calyx segments broadly ovate, 4 :—

Leaves 3-10 in. :—

Stamens 3-4. 6. *A. acuminatum*.

Calyx cupular, shortly 3-4 lobed :—

Leaves 2-7 in. :—

Stamens 2-4. 7. *A. khasianum*.

Calyx 3-4-partite :—

Leaves 3·5-8 in. :—

Stamens 3-4. 8. *A. Menasu*.

Calyx cupular, unequally 4-lobed :—

Leaves 1·5-4 in. :—

Stamens 3-4 in. 9. *A. Wattii*.

1. *Antidesma Ghesæmbilla* Gærtn. Vern. *Heloch*, *Mikhan-tenga*, Ass.; *Theng-merok-arong*, Mik.; *Tendera*, Sylh.

A small deciduous tree or shrub; young shoots rusty or brown tomentose; branchlets lenticellate. *Bark* light brown furrowed, somewhat corky. *Leaves* 1·5-3 by 1-2 in., ovate, oblong, broadly elliptic or suborbicular, rounded or obtuse, bluntly or shortly acuminate, entire, coriaceous, glabrescent or pubescent along the nerves above, pubescent or tomentose beneath; lateral nerves 5-7 on either half,

arching, sub-parallel; base rounded, truncate or sub-cordate; petiole .1-.5 in. long; stipules caducous, linear-lanceolate, tomentose. *Flowers* minute, in densely pubescent terminal and axillary much branched spikes. *Male flowers* sessile, yellowish-green; segments ovate, 5-7-partite, densely woolly tomentose; stamens 4-7; disc 5-partite, pubescent, minute. *Female flowers* sub-sessile; disc annular, pilose; ovary densely pubescent; stigmas recurved. *Drupe* sub-globose, about .2 in. long, red, ultimately purplish, black when ripe.

GOALPARA, KAMRUP, NOWGONG, SIBSAGAR, SYLHET, CACHAR, KHASI & JAINTIA HILLS, (up to 2,800 ft.).

Fruits are edible.

Flrs. 3-5. Fr. Cold season.

2. *Antidesma Roxburghii* Wall.

A shrub; young branches densely rusty-villous. *Leaves* 4-9 by 2-3 in., obovate or oblong, elliptic-acuminate, entire, sub-coriaceous, puberulous above, villous tomentose beneath; lateral nerves 8-10 on either half; base rounded, often unequal; petiole .05-.15 in.; stipules persistent. *Flowers* sessile in stout spikes, 4-6 in. long. *Calyx* 3-4 partite, villous; segments rounded. *Stamens* 3-4; disc glabrous; pistillode sub-globose. *Female flowers*-disc hairy; ovary tomentose. *Fruit* about .25 in. long, ovoid or ellipsoid.

SIBSAGAR, SYLHET.

Flrs. 4-5. Fr. Cold season.

3. *Antidesma Buniis* Spreng. Vern. *Malung-renu*, Tipp.; *Karanda*, Sylh.; *Bol-aborak*, Garo; *Dieng-soh-silli*, Kh.; *Somkong-asing*, N. E. F. Tract; *Bor-Heloch*, *Pani-heloch*, Ass.

A small evergreen tree (30'/36''); young parts hairy. *Bark* dark-brown, .16 in. thick; fibrous and pinkish-brown inside. *Leaves* 2-7 by 1-2.5 in., oblong-lanceolate, lanceolate, oblanceolate or oblong-elliptic, shortly acuminate, obtuse, often mucronate, entire, coriaceous, glossy green, glabrescent; lateral nerves 5-10 on either half, arcuate; petiole .1-.4 in. long, pubescent; stipules caducous, reddish.

Flowers about .1 in. across, in simple or racemose pubescent spikes; bracts minute. *Male flowers*-calyx cupular, shortly toothed, sparsely pubescent; disc glabrous, lobed, fleshy; stamens 3; pistillode dilated at the top. *Female flowers*-calyx truncate or sub-entire, persistent in fruit; disc cupular, glabrous; ovary glabrous; stigmas 3-4, small. *Fruit* .25 in. long, ellipsoid, compressed, red, ultimately blackish; (pedicelled up to .2 in. long).

SYLHET, GARO HILLS, SIBSAGAR, N. E. F. TRACT, LAKHIMPUR, N. C. HILLS, LUSHAI HILLS, MANIPUR, KHASI & JAINTIA HILLS.

Fruits are edible.

Flrs. 4-5. Fr. 7-8.

4. *Antidesma nigricans* Tulasne.

A shrub; branches tomentose. *Bark* brown. *Leaves* 3.5-7 by 1.2-5 in., elliptic-lanceolate or oblong-lanceolate, acuminate, entire, sub-coriaceous, glabrous, the midrib above and nerves beneath pubescent; lateral nerves 6-12 on either half, arcuate, joined by intramarginal nerve; base obtuse, sometimes unequal; petiole .05-.2 in. long, tomentose. *Male flowers* sessile. *Calyx* 4-partite. *Disc* glabrous, hemispheric. *Stamens* 4, inserted on the disc. *Ovary* glabrous; disc glabrous; stigma terminal. *Fruits* ovoid, .16 in. across.

SIBSAGAR, SYLHET.

Flrs. 4. Fr. 11.

5. *Antidesma diandrum* Roth. Vern. *Lapha-sakho*, Mech.; *Aburok*, Garo; *Gori-ambol*, Jharua; *Chhotha-heloch*, Abutenga, *Nekhon-tenga*, Ass.; *Dieng-japeu*, Chouding, Kh.; *Bon-karancha*, Sylh.; *Ing-sum-arong*, Mik.

A deciduous shrub or small tree; branches spreading; young parts rusty-pubescent. *Bark* greyish brown, thin, rough; blaze light red. *Leaves* (turning deep red before falling) 1.5 by .5-1.5 in., variable, oblong to lanceolate, ovate or obovate, acute or acuminate, entire, sub-coriaceous, glabrous and shining above, rusty-pubescent along the nerves beneath; lateral nerves 3-8 on either half, slender; base

cuneate or acute; petiole .05-.15 in. long, pubescent; stipules lanceolate, deciduous. *Flowers* minute, diœcious, greenish-yellow, in slender lax terminal or lateral glabrous racemes; all flowers pedicelled. *Male flowers*-calyx obtuse, 4-lobed or obscurely 4-toothed; stamens 2 (rarely 3) at the base of the glabrous disc; pistillode 0. *Female flowers*-calyx more deeply lobed than the males; disc annular. *Ovary* glabrous; style terminal. *Fruit* about .16-.2 in. across, smooth, purplish red when ripe, ovoid, acute.

Common throughout the province. Ascending upto 4,500 ft.

Wood 41 lbs. per c. ft. pinkish red or cream coloured, hard, close grained. The acid leaves are eaten and made into preserve. Fruits are acid, edible.

Flrs. 4-6. Fr. Cold season.

6. *Antidesma acuminatum* Wall. Vern. *Dieng-soh-lang-ngiu*, *Dieng-pothar*, Kh.; *Pani-heloch*, Ass.

A shrub or a small tree; branchlets tomentose. *Leaves* bifarious, 2.5-9 by 1.3 in., elliptic-lanceolate or oblong-lanceolate, caudate-acuminate, entire, thinly coriaceous, almost glabrous except the midrib and nerves beneath; lateral nerves 6-11 on either half, slender, arching; base rounded or obtuse, sometimes unequal-sided; petiole .1-.3 in. long. *Male flowers* in paniced hairy racemes; sepals 3-4; disc fleshy, glabrous; stamens 3-4; pistillode conspicuous. *Female flowers* in much larger paniced racemes; ovary glabrous. *Fruit* .16 in. long, red when ripe, ultimately blackish, ellipsoid, acuminate, crowned by the style.

LAKHIMPUR, NOWGONG, SYLHET, SIBSAGAR, KHASI & JAINTIA HILLS, (upto 4,000 ft.).

Fruits are edible.

Flrs. 6-7. Fr. Cold season.

7. *Antidesma khasianum* Hk. f. Vern. *Dieng-soh-syllih*, Kh.

A shrub or a small tree; young shoots sparsely pubescent; branchlets greyish-white. *Leaves* bifarious, 2-6 by 1.2-5 in., oblong-elliptic, elliptic-lanceolate or narrow-lanceolate, acuminate, entire, sub-coriaceous, dark green

above, midrib and nerves sparingly pubescent when young, otherwise glabrous; lateral nerves 6-10 on either half; slender, arched; base cuneate or acute; stipule linear-lanceolate; petiole $\cdot 1\text{--}\cdot 3$ in. long. *Male* racemes slender, pubescent, up to 2 in. long; flowers pedicelled; calyx cupular, shortly 3-4 lobed; stamens 2-4, inserted on the disc. *Female* racemes much stouter. *Fruit* sub-globose or ellipsoid, $\cdot 25\text{--}\cdot 3$ by $\cdot 12\text{--}\cdot 16$ in., red, ultimately blackish, crowned with remains of the style; stone strongly reticulated.

LAKHIMPUR, SYLHET, KHASI & JAINTIA HILLS (up to 4,700 ft.).

Fruits are edible.

Flrs. 7. Fr. 10-11.

8. *Antidesma Menasu* Miquel.

A small or middle-sized tree; branchlets, stipules, and inflorescence velvety-tomentose; branchlets lenticellate. *Leaves* $3\cdot 5\text{--}8$ by $1\cdot 2\text{--}2\cdot 5$ in., elliptic-oblong or elliptic-lanceolate, acuminate, entire, sub-coriaceous, glabrous except the midrib, shining on both sides, paler beneath; lateral nerves 6-10 on either half, arched; base rounded or acute; petiole $\cdot 05\text{--}2$ in. long; stipules linear-lanceolate. *Flowers* in axillary and terminal racemes, often paniced; all flowers with stout short pedicels; bracts very small, acute, setaceous. *Male flowers*-calyx cupular, 3-4-partite; lobes rounded; stamens 3-4, united between the lobes of the glabrous disc. *Female flowers*-calyx minute, cupular; ovary glabrous; stigma 3-5. *Fruit* ovoid or ellipsoid, acute, $\cdot 12\text{--}\cdot 16$ in. long, crowned with the stigma.

Three sheets of *Antidesma Menasu* were collected by G. Mann, but there is no record of *time and place*.

Flrs. 5-6. Fr. Cold season.

9. *Antidesma Wattii* Hk. f.

A rigid shrub, woody; scarcely more than 6 ft. high on rocks near streams; branches densely leafy. *Bark* ashy grey. *Leaves* $1\cdot 5\text{--}4$ by $\cdot 2\text{--}\cdot 5$ in., linear-lanceolate, acuminate, margins recurved, slightly coriaceous, glossy green above,

paler beneath, glabrous except the midrib above; lateral nerves 5-10 on either half, ascending, very slender; base cuneate; petiole .05 in. long; stipules small, subulate. *Flowers* pedicelled in racemes. *Male flowers* minute; calyx cupular, 4-lobed; stamens 3-4 on the glabrous, deeply lobed small disc. *Fruit* ovoid or ellipsoid (hardly compressed) tipped with the style; stone slightly compressed.

MANIPUR (Wall), LUSHAI HILLS, (Kanjilal's No. 4755).

Flrs. Hot season. Fr. 11.

18. DAPHNIPHYLLUM Blume.

Evergreen trees, glabrous. *Leaves* alternate, long-petiole, entire, penninerved, approximate at the ends of branchlets. *Flowers* diœcious, apetalous, in axillary racemes. *Male flowers*-perianth segments 3-8, small, more or less connate; stamens 5-18; anthers large, basifixed, often apiculate; pistillode absent. *Female flowers*-perianth as in male; disc obsolete or of 4-6 scales or glands. *Ovary* imperfectly 2-celled; stigmas short, distinct, thick, recurved, entire; ovules 2 in each cell. *Drupe* oblong, usually 1-seeded. *Seed* with a membranous testa; albumen fleshy; embryo small.

Calyx obsolete :—

Leaves papillose underneath :—

Lateral nerves 8-13 on either half :—

Stamens 5. 1. *D. himalayense*.

Leaves not at all papillose :—

Lateral nerves 12-16 on either half :—

Stamens 9-10. 2. *D. chartaceum*.

1. *Daphniphyllum himalayense* Muell. Vern.
Dieng-synrang-thuli, Kh.

A small tree (40'/35"). *Bark* greyish, smooth, but often with blackish warts and faint horizontal wrinkles, .2-.3 in. thick; inside dun-brown, speckled, turning chocolate brown or light red; "Wood greyish-brown with streaks of bright crimson". *Leaves* 4-8 by 1-2 in., oblanceolate or oblong-lanceolate, acute or acuminate, entire, coriaceous, glabrous and shining above, lateral nerves 8-13 on either half; petiole 1-2 in. long. *Flowers* diœcious, in

axillary racemes, 3-4 in. long. *Stamens* 5; anthers apiculate. *Ovary* imperfectly 2-celled; 2-ovules in each cell; stigma short. *Drupe* oblong, ellipsoid, .5-.6 by .2-.3 in.

KHASI HILLS, (upto 5,500 ft.).

Flrs. 3-4. Fr. 7-9.

2. *Daphniphyllum chartaceum* Roenth.

A small tree. *Branches* closely lenticellate towards the apex. *Leaves* 5-8 by 1-1.5 in., oblong, elliptic, acute, chartaceous, shining beneath; lateral nerves 12-16 on either half; base acute or sub-acute; petiole .8-1.6 in. long. *Male* raceme .6-1 in. long; pedicel .12-.17 in. long; calyx obsolete; stamens 9-10. *Female flowers* not seen. *Fruit* .4-.52 in. long, ellipsoid; pedicel of fruit .3-.4 in. long.

KHASI HILLS (Hooker) ASSAM (King's collection).

, (K. Rosenthal in Pflanzenreich IV 147 A 1919).

19. SAUROPUS Blume.

Shrubs or undershrubs. *Leaves* alternate, distichous, membranous, quite entire; stipules minute. *Flowers* monœcious, apetalous, minute, pedicelled, axillary, clustered or solitary. *Male flowers*-calyx disciform, lanceolate or turbinate; segments 6; bases with thickened folds, sometimes reflexed; disk 0; stamens 3; filaments united into a trigonous column; anthers sessile on the angles; cells linear or sub-globose, parallel. extrorse; pistillode 0. *Female flowers*-calyx large, persistent, accrescent; segments 6, disc 0. *Ovary* ovoid or globose, 3-celled, rounded or concave at the apex; ovules 2 in each cell; style 3, very short, spreading, 2-fid or 2-partite. *Fruit* globose or depressed, fleshy or coriaceous, 6-valved or breaking up irregularly with 6 trigonous crustaceous or bony cocci; albumen fleshy; embryo straight or nearly so; cotyledons flat, broad.

Style apical or sub-apical :—

Leaves penninerved :—

Branchlets angular :—

Leaves ovate-oblong :—

Calyx disciform, 6-fid; segments

spreading. I. *S. androgynus*.

Branchlets terete :—

Leaves oblong or linear-oblong, obtuse :—

Calyx disciform, 6-fid; segments rounded or reniform. 2. *S. oblongifolius*.

Leaves lanceolate-acuminate :—

Calyx 6-partite; segments oblong. .. 3. *S. lanceolatus*.

Leaves ovate-lanceolate, acuminate :—

Calyx deeply 5-fid; segments obovate, spathulate. 4. *S. macrophyllus*.

Leaves triple-nerved :—

Leaves ovate or lanceolate, acuminate, glabrous :—

Calyx enlarged in fruit; segments ovate-oblong. 5. *S. trinervius*.

1. *Sauropus androgynus* (Linn.) Merr. (Syn. *Sauropus albicans* Bl.) Vern. *Dieng-soh-pit*, Kh.

A small shrub, quite glabrous; branchlets angular. *Leaves* 1·5-4 by ·5-2 in., ovate-oblong or ovate-lanceolate, acute or obtuse, entire, membranous, glabrous; glaucous beneath; lateral nerves 4-5 on either half, very slender; base truncate or rounded; petiole ·1-·12 in. long; stipules persistent. *Male flowers* reddish-green; pedicels very slender; calyx disciform; segments 6. *Female flowers* pedicels ·5-·9 in.; calyx-segments broad, obovate-obtuse. *Fruit* globose, ·5-·75 in. across, fleshy, white, tinged with rose, bursting irregularly, supported on the somewhat enlarged calyx; cocci ·25 in. long, with vertical hollow.

SIBSAGAR, SYLHET, CACHAR, KHASI HILLS, (Tharia East), N. E. F. TRACT (Balek). (Burkill's No. 36431).

Flrs. 9. Fr 11-1.

2. *Sauropus oblongifolius* Hk. f.

Quite glabrous. *Leaves* 2-3·5 by ·6-1 in., ovate-lanceolate, acuminate; base rounded or cuneate; petiole ·1 in. long. *Calyx* 5-partite; lobes narrow. *Fruit* globose, ·3 in. across, splitting into 6 valves.

UPPER ASSAM, MISHMI HILLS (Griffith) (Kew distribution 4824. F.B.I., V., p. 338).

3. Sauropus lanceolatus Hk. f.

Quite glabrous; branches terete. *Leaves* 3-4·5 by 1 in., lanceolate, acuminate; base cuneate or rounded. *Calyx-segments* 6, oblong, obovate. *Fruit* globose, sessile, ·3 in. across, smooth, bursting irregularly; epicarp thinly crustaceous; cocci ·25 in. long, with a small basal vertical perforation.

MISHMI HILLS, UPPER ASSAM (Kew 4825). (F.B.I., Vol. V. p. 333).

4. Sauropus macrophyllus Hk. f. Vern. Shung-rung-phang, Kach.

A shrub or a small tree with simple stem and thin spreading branches. *Leaves* 3-9 by 1·5-3 in., ovate-lanceolate, acuminate, entire, thinly coriaceous, glabrous; lateral nerves 7-12 on either half; base cuneate or acute; petiole ·1 in. long. *Flowers* in long peduncles, brick red, solitary or fascicled at axils of leaves. *Male flowers*-pedicels filiform, ·5 in. long; calyx-segments almost free, oblong, obtuse, glabrous. *Female flowers*-calyx deeply 5-partite; segments obovate, spatulate. *Fruit* depressed globose, ·7 in. across, seated on a somewhat enlarged caruncled calyx; cocci with a large ventral hollow.

LAKHIMPUR, SIBSAGAR, NOWGONG, DARRANG.

Flrs. 1. Fr. 4.

5. Sauropus trinervius Muell. Arg.

An undershrub, about 4-5 ft. high, very bitter, glabrous. *Leaves* 2-4 by ·8-1·5 in., narrow, ovate-lanceolate, acuminate, membranous, glabrous, 3-nerved at the base; base rounded, truncate or cuneate; petiole ·05-·1 in. long; stipules triangular, lanceolate, subulate. *Male flowers*-in axils of imbricating bracts; calyx narrow. *Female flowers*-sepals 3, broad; petals 3, alternating. *Ovary* superior. *Fruit* 1 in. across, globose; cocci ·5 in. long, with a large ventral hollow.

CACHAR, SYLHET, KHASI HILLS, (upto 4,200 ft.).

Flrs. 5-8. Fr. 10-12.

20. BREYNIA Forst.

Shrubs or small trees. *Leaves* alternate, quite entire. *Flowers* minute, monoëcious; perianth simple, calycine. *Male flowers*: perianth turbinate or urceolate, 6-lobed or 6-cleft; rims of tube thickened; disc obsolete; stamens 3; filaments united in a short truncate trigonous column; anthers adnate to the column; dehiscence extrorse; pistillode 0. *Female flowers*: perianth 6-cleft, coriaceous, persistent, somewhat accrescent; disc obsolete; ovary trilocular; styles 3, short, sparsely bifid or 2-partite. *Fruit* succulent or coriaceous, globose or depressed, 6-valved or breaking up irregularly, containing 3-6 indehiscent trigonous crustaceous cocci; albumen fleshy; embryo straight or nearly so; cotyledons flat, broad; radicle long.

Fruit depressed-globose, orange, .5-.75 in.

across :—

Female perianth greatly enlarged in fruit. .. 1. *B. patens*.

Fruit globose, red, .25-.5 in. across :—

Female perianth hardly enlarged in fruit. .. 2. *B. rhamnoides*.

1. *Breynia patens* Benth. Vern. *Soh-matiar-syurang*, Kh.; *Khakra*, Sylh.; *Chhitki*, Beng.

A shrub or small tree; branches spreading; branchlets slender, angular. *Bark* smooth, grey. *Leaves* distichous, .4-1.3 by .2-.6 in., broadly elliptic, obtuse, membranous, glabrous, glaucous beneath; lateral nerves 3-6 on either half; petiole .05-.1 in. long; stipules .1 in. long, subulate, persistent. *Flowers* appearing with young leaves, axillary; pedicels filiform in upper axils, male in lower. *Male flowers* pale yellow, fascicled; perianth rather turbinate, truncate or obscurely crenate, persistent and greatly enlarged in fruit; anthers acute to the staminal-column, which is produced beyond them. *Female flowers* greenish; perianth deeply cleft; segments 6, apiculate; ovary truncate; style 3, stout, bifid. *Fruit* depressed globose, .5-.75 in. across, orange, obscurely 3-lobed. *Seeds* 3-gonous; aril orange-yellow.

SIBSAGAR. GOALPARA. CACHAR, LUSHAI HILLS, GARO HILLS, KHASI & JAINTIA HILLS, (upto 5,000 ft.).

Flrs. 3-5. Fr. 7.

2. *Breynia rhamnoides* Muell.

A shrub or small tree, glabrous; branches horizontal; branchlets angular. *Bark* yellowish. *Leaves* distichous, usually close-set, .5-1.5 by .3-.9 in., elliptic, obtuse or sub-acute, membranous, pale beneath; lateral nerves 4-7 on either half; base rounded or sub-acute; petiole .1-.12 in. long; stipules .1 in. long, persistent, subulate. *Flowers* very small, fascicled; female mostly solitary; pedicels filiform (male shorter than the female). *Male flowers*: perianth turbinate or sub-campanulate, obscurely lobed or subentire; staminal-column truncate at the apex, produced beyond the adnate anthers. *Female flowers*: perianth cup-shaped, 6-lobed; lobes ovate or triangular, acute, persistent, scarcely enlarged in fruit; ovary truncate, hollowed at the top with 3 (rarely more) minute styles in the cavity. *Fruit* globose, smooth, succulent, dull red, .25 in. across.

SIBSAGAR, DARRANG, KAMRUP, NOWGONG.

Flrs. 12-3. Fr. Rainy season.

21. *DRYPTES* Vahl. (Cyclostemon).

Trees or shrubs. *Leaves* alternate, coriaceous. *Flowers* diœcious, fascicled. *Male flowers*: calyx-segments 4-5, rarely 6-7, imbricate, broad, conical, somewhat unequal, ciliate; stamens 3-12, often numerous; filaments free; anthers large, introrse, rarely extrorse; cells parallel; disc central, plane or with elevated margin. *Female flowers*: calyx-segments as in male; disc hypogynous, usually annular, 1-3, rarely 4-locular; style somewhat short, rarely elongate; stigma dilated, sometimes sub-peltate, reniformly discoid; ovule 2 in each cell. *Drupe* globose or ovoid, rarely angular; endocarp coriaceous or sub-chartaceous. *Seed* sometimes one by abortion ecalcarate; testa thick; albumen fleshy; cotyledons broad, plain.

Stem without prickles:—

Stamens 6-8:—

Ovary 2-celled:—

Stigma peltate:—

Lateral nerves 8-12 on either half:—

- Fruit orange coloured, .6-.7 in. long :—
 Pedicel .1 in. long. .. 1. *D. subsessilis*.
 Lateral nerves 6-7 on either half :—
 Fruit yellowish, 1 in. long :—
 Pedicel upto .2 in. long. .. 2. *D. Griffithii*.
 Lateral nerves 10-12 on either half :—
 Sepals sub-orbicular :—
 Pedicel .25 in. long. .. 3. *D. indicus*.
 Lateral nerves 6-10 on either half :—
 Sepals oblong :—
 Pedicel .1 in. long. .. 4. *D. lancifolius*.
 Stamens numerous :—
 Stigma 2, large, sessile :—
 Male flowers glabrous :—
 Lateral nerves 5-6 on either half. .. 5. *D. eglandulosus*.
 Male flowers pubescent :—
 Stamens 16-20 :—
 Lateral nerves 10-14 on either half. 6. *D. ellipticus*.
 Stamens about 12 :—
 Lateral nerves 10-12 on either half. 7. *D. assamicus*.
 Stem with strong prickles :—
 Ovary 2-celled :—
 Leaves membranous, denticulate. .. 8. *D. jaintensis*.

1. *Dryptes subsessilis* (Kurz) Pax et Hoffm. (Syn. *Cyclostemon subsessilis* Kurz.) Vern. *Budrant*, Nep.; *Lali-phang*, Kach.; *Mei-serel*, Kuki.

A large tree (70'/72"). *Bark* greyish, fairly smooth, covered with large blackish warts, .2 in. thick; inside light brown, fibrous, with veins of darker brown, turning dirty brown. *Leaves* 3-6 by 1-2.5 in., oblong-lanceolate or oblong-elliptic, acute or acuminate, undulate or serrulate, coriaceous, glabrous; lateral nerves 8-12 on either half; base acute; petiole .1-.25 in. long. *Flowers* greenish yellow, rather fragrant, nearly sessile, clusters axillary or above the scars of fallen leaves. *Calyx-segments* concave, orbicular, greyish, pubescent outside. *Ovary* pubescent, 2-celled; stigma 2 or 3, triangular, minute. *Fruit* orange-coloured, ovoid-oblong, obscurely 4-lobed, puberulous, .6-.8 in. long; peduncle thickened.

NOWGONG, N. C. HILLS.

Used for posts. Fruits are eaten.

Flrs. 5. Fr. 11.

2. Dryptes Griffithii (*Hk. f.*) *Pax et Hoffm.* (Syn. *Cyclostemon Griffithii* Hk. f.).

A large tree. *Branches* very slender; wood hard, light brown. *Leaves* 4-7 by 2 in., elliptic-lanceolate or lanceolate-acuminate, membranous or thinly coriaceous, glabrous; lateral nerves 6-7 on either half; base equilateral; petiole .2-.3 in. long. *Styles* slender; stigma peltate. *Fruit* ellipsoid, clothed with deciduous velvet when young, yellow when ripe, about 1 in. long; glabrous, crowned with the remains of the style; pedicel 1.5-2 in.

UPPER ASSAM, MISHMI HILLS, (Kew No. 4738).

3. Dryptes indicus (*Muell. Arg.*) *Pax et Hoffm.* (Syn. *Cyclostemon indicus* Muell Arg.).

A tree. *Leaves* 3-5 in., obliquely ovate-lanceolate or oblong-lanceolate, caudate-acuminate, rather membranous, glabrous, green; lateral nerves 10-12 on either half, very slender; base unequal; petiole .1-.13 in long. *Male flowers*-yellowish, minute, glabrous, 1- or 2-3 together; pedicels very slender. *Sepal* 4, sub-orbicular, ciliate. *Stamens* 4-6, included round a flat 2-lobed disk, introrse. *Ovary* silky; styles slender, tips dilated.

KHASI HILLS, (Griffith 4376). F.B.I., Vol. V, p. 340).

4. Dryptes lancifolia (*Hk. f.*) *Pax et Hoffm.* (Syn. *Cyclostemon lancifolius* Hk. f.). Vern. *Dieng-kwai*, Kh.

A large or middle-sized tree (90'/80''); branchlets lenticellate. *Bark* greyish, smooth, .16 in. thick; inside pale white with very faint brownish streaks, finely fibrous. *Leaves* alternate, bifarious, 3.5-7 by .8-2 in., lanceolate, finely acuminate, entire, coriaceous, glabrous; lateral nerves 6-10 on either half, arcuate; base unequal with thickened margins; petiole .2-.5 in. long. *Flowers* in axillary pubescent racemes. *Sepals* oblong, pubescent, ciliate. *Anthers* 7 or 8 round a fleshy-pubescent disk. *Ovary* 2-celled, very shortly canescent outside; ovules 2 in each cell, pendulous; styles 2. *Fruit* oblong, minutely canescent, 1 by .5 in., crowned with the remains of the style; peduncles 1-1.25 in.; mesocarp

chartaceous; embryo erect; cotyledons greenish white, flat, ovate; albumen uniform, oily, completely enveloping the embryo.

GARO HILLS, KHASI & JAINTIA HILLS.

Flrs. Hot season. Fr. 11-12.

5. *Dryptes eglandulosa* (Kurz) Pax et Hoffm. (Syn. *Cyclostemon eglandulosus* Kurz). Vern. *Jam. Cachar & Manip.*

A middle-sized tree (55'/48'') glabrous. *Bark* fairly smooth, but with numerous white lenticels, .12 in. thick; inside light greenish-brown, somewhat granular; wood white, hard. *Leaves* 2.5-4 by 1.2 in., broadly elliptic or ovate-oblong, abruptly and obtusely long-acuminate, entire, coriaceous, glabrous; lateral nerves 5-7 on either half; base unequal, rounded or obtuse; petiole .2-.3 in. long. *Male flowers* glabrous. *Female flowers* long pedicelled, solitary or in few axillary tomentose clusters; sepals 4, unequal, velvety tomentose. *Ovary* tomentose, 2-celled; style triangular, dilated.

CACHAR.

Flrs. 3.

6. *Dryptes elliptica* (Hk. f.) Pax et Hoffm. (Syn. *Cyclostemon ellipticus* Hk. f.). Vern. *Moi-serel, Kuki; Bonsagu-phang, Kach.*

A middle-sized tree (45'/36''). *Bark* greyish warty, but fairly plain, .12 in. thick; inside white, mottled with brown; wood cream coloured. *Leaves* 4-7.5 by 1.2-5 in., lanceolate or narrow-elliptic, bluntly acuminate, serrate, coriaceous, glabrous; lateral nerves 10-14 on either half, very slender; base unequal, cuneate or rounded; petiole .1-.3 in. long. *Male flowers* greenish-yellow in axillary fascicles of 4-20, rather fragrant, .2-.3 in. across; pedicels .5-.7 in. long; sepals 4, concave, orbicular, rusty pubescent, reflexed in open flowers, .1 by .12 in.; disk flat, orbicular, with a crenate margin, .1 in. across; stamens 16-20 inserted below the disk;

filaments glabrous or sparsely hairy. *Female flowers* and fruit not seen.

N. C. HILLS.

Flrs. 5.

7. *Dryptes assamica* (Hk. f.) Pax et Hoffm. (Syn. *Cyclostemon assamicus* Hk. f.). Vern. *Phang-gait-arong*, Lali, Mik.; *Dieng-pankher*, Kh.; *Dukoha*, Ass.; *Jam*, Cach. and Manip.

A small or middle-sized evergreen tree (45'/30''); branches slender, usually pendent. *Bark* ashy, .12 in. thick, fairly smooth; inside light brown; wood hard, brown. *Leaves* 2-7 by 1-3 in., elliptic-oblong or narrow oblong, acute or acuminate, serrulate, rarely entire, coriaceous, glossy green, glabrous; lateral nerves 8-12 on either half; base unequal, acute; petiole .2-.5 in. long, pubescent; stipules subulate, deciduous. *Male flowers* sepals usually 4, imbricate; stamens about 12; filament free. *Female flowers* short pedicelled in small axillary clusters. *Ovary* usually 2-celled, rusty-tomentose; stigma minute, sessile. *Fruit* globose, deep red when ripe, .5-.8 in. across, more distinctly 4-lobed towards the base, rusty, velvety tomentose.

Common throughout the province.

Fruits are edible.

Flrs. 10-1. Fr. 3-4.

8. *Dryptes jaintensis* (Clarke) Pax et Hoffm (Syn. *Cyclostemon jaintensis* C. B. Clarke).

A tree; stem with long prickle; young shoot finely silky. *Leaves* membranous, denticulate. *Fruit* sessile, solitary, always axillary, ellipsoid, velvety, .75 in. long, 2-celled, but 1-seeded, supported by 3 round persistent sepals, crowned by the stigma consisting of 2 sessile circular plates.

(Flowers unknown hence the position in the Genus is unknown). (Brandis-Inuiian Trees, p. 565).

23. GLOCHIDION Forst.

Evergreen trees or shrubs. *Leaves* bifarious, alternate, entire, shortly petioled. *Flowers* small, monœcious or

dicœious in axillary cluster; perianth simple; disc 0. *Male flowers*: calyx-segments usually 6 in 2 series, imbricate, spreading; stamens 3-8, connate in an ellipsoid or oblong column; connectives usually produced in free tips or connate in a column; anthers extrorse. *Female flowers*: calyx with 6 short imbricate segments or shortly tubular and unequally toothed or cleft. *Ovary* 3-15-celled; ovules 2 in each cell; styles connate in a column, lobed or toothed at the apex. *Fruit* a capsule of 3 or more 2-valved cocci, often with twice as many lobes as cells, globose or orbicular or depressed or intruded at the base and apex, crowned by the often enlarged style; cocci crustaceous or coriaceous; epicarp separable or not. *Seeds* hemispheric or laterally compressed; testa crustaceous with often a succulent coat; albumen fleshy; cotyledons flat.

Styles connate into a column :—

 Anthers 4 or more :—

 Female sepal 5-6, distinct or connate at base :—

 Ovary 8-15-celled :—

 Style broad, convex, with a hollowed top :—

 Capsule on short stout pedicels. .. 1. *G. multiloculare*.

 Style conical, truncate :—

 Capsule sessile. 2. *G. coccineum*.

 Ovary 3-8-celled :—

 Style exserted :—

 Capsule almost glabrous, usually 12-lobed :—

 Leaves glabrous; base acute. .. 3. *G. lanceolatum*.

 Capsule sessile, 8-10-lobed :—

 Leaves lanceolate :—

 Ovary tomentose. 4. *G. Gamblei*.

 Capsule stalked, obscurely lobed :—

 Leaves oblong or ovate-oblong :—

 Ovary glabrous. 5. *G. zeylanicum*.

 Ovary 3-8 celled :—

 Style not exserted :—

 Leaves elliptic-oblong, 5-7 in. long, tomentose beneath. 6. *G. hirsutum*.

 Leaves lanceolate, 2-4 in. long, glaucous or thinly pubescent beneath. .. 7. *G. oblatum*.

Anthers 3 :—

Sepals 5-6, distinct or connate at base only:—

Style exserted in flowers:—

Female pedicelled:—

cous; style a 3-grooved cone. .. 8. *G. Thomsoni*.

Branchlets pubescent :—

Leaves ovate or elliptic, softly tomentose:—

Capsule 4-7 lobed, almost sessile. .. 9. *G. velutinum*.

Leaves elliptic, obtuse :—

Capsule 8-10 lobed, distinctly grooved (4-5 celled). .. 10. *G. Heyneanum*.

Leaves lanceolate, very glaucous beneath :—

Capsule 4-6 lobed, long pedicelled. .. 11. *G. acuminatum*.

Female sessile or almost so :—

Branchlets glabrous :—

Leaves shining, glabrous, lanceolate :—

Capsule 8-10 lobed. .. 12. *G. Daltoni*.

Leaves-elliptic, acuminate :—

Capsule 3-6-lobed. .. 13. *G. khasicum*.

Style not or slightly exserted in flowers :—

Leaves elliptic or elliptic-oblong, purplish beneath :—

Style usually columnar, conical :—

Capsule 3 in. across, obscurely 4-lobed. .. 14. *G. assamicum*.

Leaves lanceolate, shining :—

Ovary sub-globose, glabrous, usually 5-celled... 15. *G. sphærogynum*.

Leaves ovate-oblong or elliptic-oblong :—

Ovary globose, pubescent, usually 6-celled. .. 16. *G. arborescens*.

1. *Glochidion multiloculare* Muell. Vern. *Garumora*, *Pani-mudi*, Ass.; *Thaka-biphang*, Mech.

An ever gregarious bushy shrub or small tree; branchlets pubescent, sometimes glabrous; twigs angular. *Bark* greyish, splitting vertically, thin; blaze red; wood cream-coloured. *Leaves* 1·5-4·5 by ·5-1·5 in., oblong or elliptic-oblong, acute or obtuse, shining, entire, coriaceous, sometimes minutely puberulous above, glaucous beneath; lateral nerves 5-8 on either half, oblique; base acute; petiole ·05-·1 in. long;

stipules acuminate .1-.2 in. long. *Pedicels* short, stout. *Anthers* 4-12. *Styles* broad, convex with a hollowed top. *Ovary* 10-15-celled. *Capsule* .7-1 in. across, depressed globose; base and apex intruded. *Seeds* red.

SIBSAGAR, NOWGONG, LUSHAI HILLS, CACHAR, GOAL-PARA.

Flrs. Hot season. Fr. 11-2.

2. *Glochidion coccineum* Muell. Arg.

A shrub or small tree; branchlets angular, pubescent. *Bark* greyish, vertically-narrowly fissured. *Leaves* 3-7 in. long, oblong, elliptic-oblong or lanceolate, shortly and bluntly acuminate, entire, coriaceous, glabrous (slightly pubescent when young); lateral nerves 6-8 on either half; base rounded or obtuse; petiole .1-.16 in. long. *Flowers* clustered; pedicels slender, long in male flowers; sessile in female. *Anthers* 5 or more. *Sepals* ovate. *Anthers* 5 or more. *Style* conical with a crenulate hollowed tip. *Ovary* hairy. *Capsule* depressed, globose, .4-.5 in. across, 16-20-lobed. *Seeds* scarlet.

SIBSAGAR.

Flrs. 2-4. Fr. 8 (remains long on the tree upto the next flowering season).

3. *Glochidion lanceolarium* Dalz. Vern. Armlochan, Naga.

A shrub or a middle-sized tree (38'/25'') with spreading crown. *Bark* greyish or greyish-brown, closely and reticulately fissured, often exfoliating in flakes, very light-red inside, .2 in. thick; blaze greenish-brown; wood brownish white. *Leaves* 3-8 by 1-3.5 in., elliptic, elliptic-oblong or elliptic-lanceolate, bluntly acuminate, coriaceous (leathery), entire, dark glossy green above, pale beneath; lateral nerves 7-10 on either half; base acute; petiole .2-.5 in. long; stipules stiff, acuminate, almost thorn-like. *Male flowers* yellowish, numerous, on slender pedicels; sepals linear-oblong; connective long, acute; anthers 4-6. *Female flowers* greenish, sessile, 1-3 or more, fascicled; sepals glabrous, coriaceous, cuspidate. *Ovary*

villous, 6-8-celled; style conical from a thick base, as long as ovary. *Capsule* orbicular, depressed, .6-.9 in. across (12 lobed-Brandis), largest in the genus.

SIBSAGAR, LAKHIMPUR, SYLHET, GOALPARA, KHASI & JAINTIA HILLS, (upto 6,000 ft.).

The seeds yield an oil for burning. The wood is believed to be hard and durable.

Flrs. 9-11. Fr. 2-5.

4. *Glochidion Gamblei* Hk. f. Vern. *Bol-chring*, Garo.

A middle sized tree, sometimes quite large (60'/65''), glabrous. *Bark* dark cinnamon brown, exfoliating in thin oblong papery flakes (in large trees), otherwise with vertical parallel fissures, .2 in. thick; inside light red, fibrous. *Leaves* 2-5 by .8-1.3 in., lanceolate, acuminate, entire, coriaceous, deep glossy green above, paler beneath; lateral nerves 6-9 on either half; base unequilateral, oblique, acute; petiole .05-.12 in. long. *Male & Female flowers* usually in separate clusters; sepals oblong, obtuse; connective acute; anthers 4-5; style twice the length of sepals, clavate, suddenly contracted, truncate, 4-5-lobed, glabrous. *Ovary* tomentose. *Fruit* .5-.6 in. across, depressed, 8-10 lobed. *Seeds* obscurely trigonous.

GOALPARA, GARO HILLS.

Flrs. 3-4. Ripe fruit persists on the tree upto the next flowering season.

5. *Glochidion zeylanicum* A. Juss.

A small or middle sized tree, almost glabrous. *Bark* grey, thin, corky. *Leaves* 3.5-6 by 1.5-3 in., oblong, elliptic-oblong; or ovate-oblong, obtuse or bluntly acuminate, entire, coriaceous, glabrous, green and shining above, paler beneath; lateral nerves 8-10 on either half; base inequilateral, rounded or cordate; petiole .1-.2 in. long; stipules .12 in. long, acute. *Male & Female flowers* usually shortly pedicelled, together in umbellate clusters, shortly pedunculate, axillary or supra-axillary; female flowers more numerous. *Sepals* 5-6 and similar in male and female, ovate-oblong, fleshy, rounded at the apex, glabrous; anthers 5-7. *Ovary* glabrous,

4-7-celled; style united into a short cone, 5-8 dentate at the apex. *Capsule* sub-globose, obscurely lobed, .4-.6 in. across.

SIBSAGAR (Deroi Reserve, Kanjilal's No. 1871).

Flrs. Rainy season. Fr. 10-12.

6. *Glochidion hirsutum* Muell. Arg.

A shrub or small tree; young parts softly tomentose. *Leaves* 5-7 in. long, elliptic-oblong or oblong lanceolate, coriaceous, densely and softly white or rusty-tomentose beneath; lateral nerves 10-13 on either half; base rounded or cordate; petiole .16 in. long. *Male & Female flowers* usually in the same cluster, usually supra axillary; peduncles usually short and stout. *Male flowers* pedicels slender, .2-.5 in. long; sepals 6, hirsute externally, glabrous within; anthers 6; connective short. *Female flowers* hirsute; pedicels short; sepals 6. *Ovary* globose, glabrous or hairy; style conical, shorter than the sepals and often entire. *Capsule* 4-6-celled, globose, obscurely lobed, not deeply intruded at base and apex.

LAKHIMPUR, SIBSAGAR, CACHAR, KHASI HILLS.

Flrs. 11-12. Fr. 2.

7. *Glochidion oblatum* Hk. f. Vern. *Gorumara*, Ass.; *Podousi-asing*, *Tapokili*, Miri.

A small tree; branchlets tomentose. *Bark* reddish-brown, finely fibrous, .12 in. thick. *Leaves* .8-4 by .5-1 in., lanceolate, oblong-lanceolate, acute, entire, coriaceous, glabrous above except the midrib, glaucous and sparsely pubescent beneath; lateral nerves 4-8 on either half; base oblique, acute; petiole .05-.1 in. long; stipules filiform. *Male flowers* .2 in. across, yellowish, pubescent; pedicels filiform, .5-.7 in. long; sepals sub-spathulate or obovate; anthers 4-6. *Female flowers* minute, very shortly pedicelled, tomentose. *Ovary* 4-5-celled, densely tomentose; style short, stout,

conic, not exserted. *Capsule* depressed, orbicular, obscurely lobed, pubescent, crown not intruded.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, LUSHAI HILLS, N. C. HILLS.

Flrs. 5. Fr. 11-12.

8. *Glochidion Thomsoni* Hk. f.

A tree (35'/25'') with spreading crown, glabrous. *Bark* greyish, .3 in. thick; inside reddish, fibrous; wood cream-coloured. *Leaves* 2.5-5 by .8-1.5 in., elliptic or oblong-elliptic, shortly and bluntly acuminate, thinly coriaceous, green and glabrous above, glaucous beneath; lateral nerves 6-9 on either half, very slender; base oblique, acute or obtuse; petiole .1-.3 in. long. *Male flowers* few, minute; sepals elliptic; anthers 3; connective short. *Female flowers* numerous; pedicels about .9 in. long; sepals minute. Ovary 3-lobed; style a fleshy depressed 3-grooved cone. *Capsule* 3 in. across, usually 6-lobed (more or less).

CACHAR, SYLHET, GARO HILLS, KHASI & JAINTIA HILLS, (4-5,000 ft.).

Flrs. 7-8. Fr. 9-10.

9. *Glochidion velutinum* Wight. Vern. *Dieng-jem*, *Wah-puriem*, *Uding-that*, Kh.; *Bolchiring*, Garo; *Dol-poduli*, Ass.; *Bon-hadow*, Kach.

A shrub or a small tree, softly tomentose or pubescent. *Bark*, brownish, rough, 3-4.5 in thick; inside reddish, fibrous; wood cream-coloured. *Leaves* 1.5-5 by 1-2.25 in., ovate, elliptic, oblong or lanceolate, acute, obtuse or abruptly and shortly acuminate, coriaceous, glabrescent above, tomentose beneath; lateral nerves 5-10 on either half; base rounded or narrowed to the petiole (.05-.15 in. long). *Flowers* in axillary clusters; males and females usually together. *Male flowers* .15 in. long; pedicels filiform, pubescent; sepals 6, unequal, pubescent outside, glabrous within; stamens 3; anthers connate in the lower half; connective acute. *Female flowers* pedicels short, stout, pubescent; calyx pubescent; segments free nearly to the base, unequal. *Ovary*

pubescent, 4-7-celled; style thickened at the tip, truncate, 4-7 toothed. *Capsule* .3-.5 in. across, depressed, usually 4-7 lobed (I have found up to 10 lobes). *Seeds* red.

DARRANG, SIBSAGAR, KAMRUP, N. C. HILLS, KHASI & JAINTIA HILLS.

Flrs. 10. Fr. 1.

10. *Glochidion Heyneanum* Wight.

A large tree; branchlets tomentose. *Leaves* 2-5 in., elliptic or oblong, obtuse, acute or cuspidate, coriaceous, glabrous above, sparsely pubescent beneath; lateral nerves slender; base acute; petiole .1 in. long; stipules triangular. *Male flowers* small, short-pedicelled; sepals hoary-pubescent; anthers 3. *Female flowers* pedicels longer; sepals narrow. *Ovary* 4-5-celled; style slender, clavate, truncate, pubescent, exserted, twice the length of perianth. *Capsule* depressed, .3 in. across, 8-10-lobed, at length glabrous.

Makum Forests, Lakhimpur, KHASI HILLS, (G. Mann).

Flrs. 3. Fr. 9-10.

11. *Glochidion acuminatum* Muell. Arg. Vern. *Dieng-jerti*, Kh.; *Dieng-jem*, Synt.

A middle sized tree (35'/30''); branchlets pendent; young parts pubescent. *Bark* greyish-brown, exfoliating in irregular-shaped scales, .12 in. thick; inside reddish-brown, fibrous. *Leaves* 2-5 by .5-1.5 in., oblong, acuminate or lanceolate, sub-coriaceous, puberulous, glaucous beneath; lateral nerves 7-12 on either half; base oblique, cuneate or rounded; petiole .05-.12 in. long; stipule acuminate. *Flowers* all pedicelled, fascicled. *Male flowers* small; sepals obovate; anthers 3; connective imbricate. *Female flowers* style clavate, twice the length of the sepals. *Capsule* 4-6 lobed, .2-3 in. across; stalk .25-.3 in. long. *Seed* reddish, shining.

N. C. HILLS, KHASI & JAINTIA HILLS, (4,500 ft.).

Flrs. 4. Fr. 9.

12. Glochidion Daltoni Kurz.

A deciduous shrub or small tree; branchlets glabrous. *Leaves* 2·5 by ·75-1·2 in., lanceolate or oblong-lanceolate, acuminate, glabrous, shining; lateral nerves slender; base acute; petiole ·1 in. long; stipules ovate, acute. *Flowers* both sexes in the same fascicles. *Male flowers* glabrous; sepals oblanceolate; pedicels ·2·5 in. long; anthers 3. *Female flowers* almost sessile; sepals glabrous without, sparsely pubescent within. *Ovary* tomentose, 4-6 celled; style clavate, 4-6-toothed. *Capsule* ·5·8 in. across, nearly sessile, 8-10-lobed, crowned by the deciduous style when young.

N. E. F. TRACT. (No specimen in Forest Herbarium, Shillong).

Flrs. 3.

13. Glochidion khasicum Hk. f. Vern. Dieng-Jirti, Kh.

A middle sized tree (35'/40''), glabrous; branchlets angular. *Bark* fairly smooth, brownish; inside reddish brown with fine white streaks. *Leaves* 2-6 by ·8-2·5 in., elliptic, ovate-elliptic, entire, acuminate, coriaceous, glabrous (brownish beneath when dry); lateral nerves 5-7 on either half. arcuate; base oblique, inequilateral, rounded, obtuse or truncate; petiole ·1·3 in. long. *Male flowers* shortly pedicelled; sepals lanceolate, obtuse; anthers 3; connective imbricate. *Female flowers* sub-sessile; sepal ovate-oblong, unequal; style 2-3 times the length of the sepal, sub-cylindric, unequally 2-3-toothed. *Ovary* glabrous. *Capsule* ·3 in. across, depressed, globose, 6-12-lobed, glabrous, reddish when ripe.

KHASI & JAINTIA HILLS, (upto 5,500 ft.).

Flrs. Hot season. Fr. 9-11.

14. Glochidion assamicum Hk. f. Vern. Panichhitiki, Ass.; Tachak-changne, Duff.; Dieng-soh-kassiu, Kh.; Awal, Sylh.

A shrub or middle sized tree (45'/36''); branchlets glabrous, angled. *Bark* greyish, thin; blaze reddish, fibrous; wood

cream-coloured. *Leaves* 2-7 by 1-3 in., elliptic or elliptic-oblong or lanceolate, acuminate, entire, coriaceous, glabrous, pale purplish beneath; lateral nerves 6-9 on either half; base acute; petiole .1-.5 in. long. *Male flowers* clustered; pedicels slender, long; sepals narrow, somewhat dilated towards the apex; anthers 3 (sometimes 4-5). *Female flowers* densely clustered, subsessile; sepal linear-oblong; style columnar. *Ovary* globose, glabrous or pubescent. *Capsule* .3 in. across, obscurely 4-lobed.

LAKHIMPUR, SIBSAGAR, DARRANG, KHASI & JAINTIA HILLS, (upto 4,500 ft.).

Flrs. 3-6. Fr. Cold season.

15. *Glochidion sphærogynum* Kurz. Vern. *Chaiang*, Naga; *Uiangon*, Manip.; *Bol-Jagru*, Garo; *Theng-korang-wong*, Mik.; *Dieng-soh-um*, Kh.

A middle sized or small tree, glabrous; branchlets pendulous. *Bark* dark grey or greyish brown, softly corky, fibrous, .6 in. thick; inside pink to brick red; wood cream-coloured. *Leaves* 2-6.5 by .6-1.5 in., lanceolate or narrow lanceolate (falcate), acuminate, coriaceous, shining, glabrous; lateral nerves 7-10 on either half; base oblique, inequilateral, acute or rounded; petiole .1-.3 in. long; stipule triangular. *Male flowers* small, pedicelled; sepals elliptic; anthers 3. *Female flowers* densely fascicled, sub-sessile; sepals orbicular. *Ovary* glabrous, usually 5-celled; style entire, very large, sub-globose. *Capsule* deeply 8-12-lobed, .25-.5 in. across, depressed in congested fascicles of 6-10 on tubercles.

SIBSAGAR, MANIPUR, CACHAR, SYLHET, GOALPARA, GARO HILLS, KHASI.

Flrs. Hot season. Fr. 11-1.

16. *Glochidion arborescens* Bl. Vern. *Panimudi*, Ass.; *Toi-tit*, Lush.

A small or middle sized tree (40'/30''); branches spreading. *Bark* greyish-brown, fissured, .5 in. thick; inside red with white streaks. *Leaves* 3-9 by 1.3-4 in., ovate or

ovate-oblong, elliptic or elliptic-oblong, acute or shortly acuminate, coriaceous, glabrous above, pubescent beneath densely along the nerves; lateral nerves 6-9 on either half; base oblique, rounded or shallow cordate; petiole $\cdot 2\cdot 5$ in. long. *Male flowers* calyx-segments 3, pubescent. ovate-oblong. *Female flowers* fascicled, subsessile or shortly pedicelled; pedicels pubescent; calyx segments 6, rusty-pubescent, purplish inside. *Ovary* globose, pubescent, 6-celled; style connate. *Fruit* sub-globose, $\cdot 25$ in. across.

LAKHIMPUR, N. C. HILLS, CACHAR, SYLHET.

Flrs. 4. Fr. 1-2.

G. mishmiense *Hk. f.*

A small tree; branches stout, brittle, ribbed, tomentose. *Leaves* 4-8 by $2\cdot 2\cdot 5$ in., oblong, obtuse or bluntly acute, coriaceous, glabrous except the nerves; lateral nerves 8-10 on either half, prominent beneath; base acute or rounded. *Stigma* sub-globose or very shortly conic. sunk in the apical depression. *Capsules* depressed, 5 in. across, 8-10-lobed, hoary-tomentose. *Seeds* $\cdot 12$ in. across, mermispheric, red.

N. E. F. TRACT (Burkill 37789) 2,500 ft., MISHMI HILLS, AKA HILLS, (Forest Herbarium, Shillong, 16620).

Flrs. 8. Fr. 1.

24. JATROPHA Linn.

Herbs, shrubs or trees often prickly or glandular. *Leaves* alternate, entire or digitately lobed or partite; stipules often ciliate. *Flowers* monœcious in terminal cymes; the central flowers of the cyme or its fork usually female; perianth usually double. *Male flowers* calyx-segments 5, often coloured, imbricate; petals 5, free or connate, disk entire or of 5 glands; stamens numerous; filaments all or the inner connate below; anthers erect, ovate or oblong; the cells parallel, contiguous. *Female flowers* calyx as in male; petals sometimes absent. *Ovary* 2-4 celled; ovules solitary in each cell; styles connate below, 2-fid above; the lobes entire or again 2-fid. *Fruit* a capsule 2-4 two-valved cocci; endocarp crustaceous or bony. *Seeds* ovoid or oblong; testa crustaceous; albumen fleshy; cotyledons broad, flat.

Petals free or nearly so :—

Petioles clothed with numerous fascicled and branched gland-tipped bristles. 1. *J. gossypifolia*.
 Petals united to the middle :—

Petiole glabrous. 2. *J. Curcas*.

1. *Jatropha gossypifolia* Linn. Vern. *Bhotera*, Ass.; *Lal-bherenda*, Beng.

A shrub. *Leaves* palmately 3-5-lobed; petioles clothed *Lal-Bherenda*, Beng.

A shrub. *Leaves* palmately 3-5 lobed; petioles clothed with numerous fascicled and branched stipitate glands. *Corolla* lobes nearly free. *Stamens* connate. *Ovary* pubescent. *Capsule* .5 in. across, rugose.

A native of Brazil, cultivated in gardens and found as an escape.

Flrs. & Fr. Usually rainy season.

2. *Jathropha Curcas* Linn. Vern. *Sabon*, Sylh.; *Borbandong*, Garo; *Bongali-bhotora*, Ass.; *Radau-khrong*, Kach.; *Thing-nai-wong*, Kuki; *Dieng-song-la-moh-dkhar*, Kh.; *Bherenda*, Beng.

A soft-wooded deciduous shrub or small tree; young parts tomentose; trunk irregular. *Bark* yellowish-brown, thin and papery on stem; leaf scars prominent. *Leaves* 3-6 by 3-5 in., sub-orbicular, ovate, broadly cordate, usually 3-5 lobed, shortly acuminate or acute, glabrous or sparsely pubescent on the nerves beneath; petiole 3-9 in. long. *Flowers* greenish yellow, in long-peduncled often paniced pubescent cymes. *Male flowers* calyx-segments 5, somewhat unequal, elliptic or obovate; corolla campanulate, exceeding the calyx; lobes 5; stamens 10, in 2 series. *Female flowers* calyx-segments ovate, acute; corolla scarcely exceeding the calyx; styles 3, connate at base; stigma 2-fid. *Fruit* .7-1 in. long, ovoid-oblong. *Seeds* oblong, dark-brown.

Native of TROPICAL AMERICA, cultivated and naturalised. Makes good hedges. The juice is believed to be good for sores. The seed oil is medicinal as a purgative and poisonous in large doses.

Flrs. & Fr. Almost throughout the year.

25. ALEURITES Forst.

Aleurites moluccana Willd. (Syn. *A. triloba* Forst.).
Vern. *Mota-bhela*, Ass.

A large handsome evergreen tree; young parts stellately tomentose. *Leaves* 4-12 by 2-5 in., variable, ovate or ovate-elliptic, deltoid or rhomboid, often lobed, acute or acuminate, undulate, obscurely crenate or entire, coriaceous, pustular beneath; petiole 2-5 in. long, biglandular. *Flowers* monœcious, in large terminal tomentose panicked cymes. *Calyx* velvety, bursting into 2 valvate lobes; petals 5, .25 in. long. *Stamens* 15-20, on a hairy receptacle. Ovary 2-celled, hairy; style with 2 long arms. *Drupe* 2-2.5 in. across. *Seeds* oily, edible.

KAMRUP, GOALPARA. Cultivated. Introduced from Malaya.

Flrs. 2-4. Fr. Following Cold season.

A. cordata Steudel.

A tree of China and Japan. *Leaves* glabrous, ovate, cordate, often deeply lobed. *Petals* .5 in. long. *Anthers* reflexed after flowering. Cultivated in UPPER ASSAM for the wood oil (*Tung*).
SIBSAGAR, LAKHIMPUR.

A. Fordii Hemsl. and **A. montana Wilson** have been successfully grown in plantations in Sibsagar (Noajan) and other localities in Assam.

The possibilities of *Tung oil* which the above species yield are by no means inconsiderable, as it is used in India in large quantities, much of which is imported.

It is used in laquering, varnishing, water proofing, oil cloth manufacture, etc.

Flrs. Rainy season. Fr. 9-10.

26. CROTON Linn.

Trees or shrub, rarely herbs. *Leaves* alternate, rarely opposite or whorled, 2-glandular at the base. *Flowers* usually monœcious, solitary or clustered, on the rachis of a terminal spiciform raceme; female flowers at the base; bracts small. *Male flowers*, calyx 5-(rarely 4 or 6) partite; segments imbricate or sub-valvate; petals 5 (rarely 4-6), never exceeding but sometimes smaller than the calyx; disc of 4-6 glands opposite the calyx segments; stamens many, inserted

on a hairy receptacle; filaments free, reflexed in bud; anthers adnate; cells parallel; pistillode 0. *Female flowers* calyx segments usually more ovate than in male, rarely accrescent; petals smaller than the calyx segments or obsolete; disk annular or of 4-6 glands. *Ovary* 3 (rarely 2-4) celled; ovules solitary in each cell; style slender, 2-4-cleft. *Fruit* a capsule, sub-equally 6-valved or of 3 separating 2-valved cocci. *Seeds* smooth; caruncle small; testa crustaceous; albumen copious; cotyledons flat.

Ovary lepidote or tomentose :—

Inflorescence lepidote :—

Leaves repand-toothed or serrate-crenate :—

Petiole 1-2 in. long :—

Capsule sub-globose, .3-.7 in. across.

1. *C. oblongifolius*.

Leaves quite entire or remotely serrate acuminate :—

Petiole .3-2 in. long :—

Capsule ovoid, 1-1.5 in. long.

2. *C. Joufra*.

Inflorescence stellately pubescent :—

Basal nerves 3-5 :—

Leaves scaberulous or pubescent with stellate hairs :—

Racemes 4-10 in. long :—

Stamens silky below.

3. *C. caudatus*.

Leaves glabrous :—

Racemes 2-3 in. long :—

Stamens glabrous (15-25).

4. *C. Tiglium*.

Inflorescence glabrous :—

Leaves membranous, glabrous :—

Racemes 2-4 in. long :—

Stamens about 10.

5. *C. lævifolius*.

Ovary glabrous :—

Calyx segments much enlarged in fruit :—

Leaves lanceolate, caudate-acuminate, serrulate.

6. *C. chlorocalyx*.

1. *Croton oblongifolius* Roxb. Vern. *Maisindai-buphang*, Mech.; *Thing-ban-thing*, Naga; *Mahunda*, Ass.; *Bol-mang-chham*, Garo; *Dieng-la-masu*, Kh.; *Marthu-arong*, Mik.

A middle-sized tree (40'/30''), often gregarious; young parts clothed with peltate orbicular scales. *Bark* greyish,

with fine reticulating vertical fissures; inside light pinkish to cream, mottled with white streaks, aromatic. *Leaves* 3-9 by 1·2-4 in., crowded at the ends of branchlets, elliptic-ovate or oblong-lanceolate, obtuse, sub-acute or bluntly acuminate, serrate or crenate, rather coriaceous, glabrous, dark green, covered with minute raised dots, paler beneath; lateral nerves 10-16 on either half, faint; base narrowed into the petiole (·5-2·5 in. long); stipules caducous, ·3 in. long. *Flowers* pale yellowish green, solitary or fascicled, in the axils of minute bracts, arranged in terminal or axillary racemes; upper males and lower females. *Male flowers* ·25 in. across; pedicels filiform; calyx segments 5, slightly connate, ovate, obtuse; petals 5, concave, oblong, woolly; stamens 12, inflexed in bud; filaments hairy at the base; disk of 5 glands. *Female flowers* calyx segments 5, acute, ciliate; petals obovate, woolly; disk annular. *Ovary* densely clothed with stellate scales, trigonous, 3-celled; ovule solitary in each cell. *Fruit* sub-globose, 3-lobed, over an inch long, ·3-·7 in. across. *Seeds* ellipsoid, smooth.

CACHAR, SYLHET, GOALPARA, GARO HILLS, NOWGONG, KHASI & JAINTIA HILLS.

Flrs. 12-2. Fr. 3-4.

2. Croton Joufra Roxb. Vern. *Mahudi*, Ass.; *Martu-arong* Mik.; *Maisinai*, Kach.; *Kharane*, Nep.; *Phepu-changne*, Duff.; *Dieng-Lamosuh*, Kh.; *Thaunang*, Manip.; *Inthap-ching*, Naga.

A shrub or a middle-sized tree (40'/30"). *Bark* greyish, exfoliating in vertical pieces, exposing a yellow surface, with vertical lenticels, about ·4 in. thick; blaze reddish white; wood whitish, hard. *Leaves* faintly aromatic 2-12 by 1·3-5 in., elliptic, linear or obovate-lanceolate, acuminate, quite entire or remotely repand, serrulate, coriaceous, glabrous, green above, paler beneath; midrib lepidote beneath; lateral nerves 10-16 on either half; base acute; petiole ·3-2 in. long. *Racemes* lepidote. *Calyx* segments stellately lepidote, ovate. *Petal* villous. *Stamens* 12; filaments villous. *Ovary* stellately tomentose; styles slender, 2-cleft. *Capsule* ovoid, 1-1·5 in. long, lepidote, faintly 3-lobed.

Common throughout the province, (upto 3,000 ft.).

Bark and leaves are used for fermenting liquor. Bark is used as a veterinary medicine.

Flrs. 12-3. Fr. 5.

3. Croton caudatus Geisel. Vern. *Dumi-shak*, Garo; *Lota-mahudi*, *Ghahe-lewa*, Ass.; *Matau*, Lush.; *Soh-Lam-brang*, Kh.; *Kum-Kum-arong*, Mik.; *Saphai-blai*, Synt.; *Rairang*, Kuki.

A large scandent shrub; young parts stellately bristly, hairy. *Bark* brownish black, old bark exfoliating in pieces exposing a whitish surface; blaze greenish white; wood whitish. *Leaves* 1·5-6 by ·8-3·5 in., ovate, sub-orbicular or ovate-acuminate, coarsely toothed or crenate-serrate, sub-coriaceous, scaberulous above, stellately pubescent beneath, hairy on both surfaces; basal nerves 3-5; base rounded, cordate or almost truncate; basal glands stalked; petiole ·3-2 in. long, scaberulous; stipules glandulose. *Racemes* slender, 4-10 in. long, stellately pubescent. *Flowers* in fascicles. *Male flowers* tomentose; petals as long as sepals, woolly; stamens 18-30. *Female flowers* sepals ovate, oblong; petals very small. *Ovary* stellately woolly; style 2-partite. *Capsule* obscurely 3-gonous, scabridly rusty-pubescent, globose or oblong, ·7-1 in. long.

Fairly common throughout the Province.

Tender shoots are used as a medicine for cholera. Used by Mikirs to blacken their teeth. A sort of gum exuded early in the morning is said to cure Cataract.

Flrs. 3-5. Fr. Cold season.

4. Croton Tigilium Linn. Vern. *Koni-bih*, Ass.; *Dieng-kymbat-lasam*, Kh.

A small evergreen tree; young leaves brown; young parts sparsely stellate-hairy. *Bark* grey, corky and lenticelled, about ·12 in. thick, pale green within, variegated from outside with tooth-like intrusions of paler tissue; wood white; pores somewhat large, in distant radial groups of 2-3. *Leaves* 2·5-5 by 1-3 in., ovate or elliptic-oblong, acute or acuminate, more or less serrate, membranous, glabrous; basal nerves

3-5; base somewhat unequal, usually rounded; basal glands 2, almost sessile; petiole .5-2 in. long. *Racemes* 2-3 in. long, glabrous. *Male flowers* sepals bearded at the apex; petals woolly; stamens 15-25, glabrous. *Female flowers* sepals sparsely hairy at base within; petals 0. *Ovary* stellately hispid. *Capsule* .75-1 in. long, obovoid, whitish, obtusely trigonous (rarely 4-gonous). *Seeds* .5-.6 in. long, obliquely oblong, somewhat glabrous, pale brownish.

A native of MALAY ARCHIPELAGO, now naturalized. SIBSAGAR, DARRANG, KHASI and JAINTIA HILLS, (3,000 ft.).

The seed oil is a drastic purgative. The wood is used for cleansing the teeth and for curing and relieving tooth ache.

Flrs. Hot season. Fr. Cold season.

5. *Croton lævifolius* Bl. Vern. *Dieng-Kharang*, *Dieng-Soh-riu*, Kh.; *Dieng-soh-kymphria*, Synt.

A middle-sized tree (55'/66"). *Bark* greyish or greyish green, about .3 in. thick; inside pinkish brown with lighter streaks, finely fibrous; wood tough; medullary rays very fine and close. *Leaves* 1-4 by .5-1.5 in., elliptic, elliptic-oblong or elliptic-lanceolate, acute or shortly acuminate, remotely and obscurely serrate, sub-coriaceous, glabrous; lateral nerves 6-12 on either half, slender; base acute; basal glands stalked; petiole .2-.8 in. long, fugaciously stellate-pubescent; stipule filiform, caducous. *Racemes* glabrous, 2-4 in. long. *Male flowers* sepals bearded at the apex; stamens about 10; filaments glabrous. *Female flowers* sepal ovate-acute, glabrous. *Ovary* globose, sparsely hispid; styles 2-partite. *Capsule* .25 in. across, sub-globose, somewhat depressed, glabrous. *Seeds* usually 2, rarely 3, brownish black; cotyledons flat.

KHASI & JAINTIA HILLS, (4,500-5,500 ft.).

Flrs. Hot season. Fr. Cold season.

6. *Croton chlorocalyx* Wall.

A small deciduous tree, quite glabrous. *Leaves* 4-8 by .8-1.2 in. lanceolate or narrow lanceolate, long-acuminate, obscurely serrulate, membranous, glabrous, paler beneath; lateral nerves 10-15 on either half; base narrowed into the

petiole which is $\cdot 4 \cdot 6$ in. long. *Racemes* cymose, shorter than the leaves, slender. *Male flowers* $\cdot 16$ in. across; sepals and petals obtuse; apex bearded; disk eglandular; stamens 12-15. *Female flowers* sepals oblong, foliaceous; petals subulate; disk 0. *Ovary* 3-lobed, oblong, glabrous, shortly stipitate; style 3, connate below, stout, recurved, 2-fid.

SYLHET, (Wallich No. 8,001 Sibpur). (F.B.I., Vol. V, p. 394).

C. sparsiflorus Morung.

An undershrub, forming bushes, often straggling, faintly fragrant; twigs green, with elongated lenticels, tubercled or striated, densely covered with stellate hairs. *Leaves* scattered, crowded near the ends of branches, 1-2.5 by $\cdot 4 \cdot 9$ in., lanceolate, elliptic-lanceolate, undulate, rather obscurely serrate, acute or sub-acute, membranous, dark-green and glabrous above, paler and sparsely hairy beneath; base rounded or obscurely cordate; petiole $\cdot 2 \cdot 3$ in. long, grooved above, stellately hairy. *Flowers* monœcious, male upwards, female below, in terminal inflorescence. *Disc* of 5 small orange-red glands. *Male-flowers* pedicelled, in clusters of 3-4; sepals 5, valvate, ovate, acute; petals 5, alternate with the sepals, attenuated at base; stamens 15-20; filaments inflexed in bud. *Female-flowers* sepals 5, lanceolate, green, persistent. *Ovary* 3-locular, ellipsoidal, densely stellate-hairy; style, spreading; ovules solitary in each cell, pendulous. *Fruit* triquetrous, shallowly 3-grooved, ellipsoidal, stellately hairy; pericarp dehiscing into 3 cocci. *Seeds* pendulous; caruncle forming an oblique thin white somewhat dentate cup.

ASSAM. (Native of South America, introduced).

Flrs. 5-7. Fr. 7-9.

27. TRIGONOSTEMON Blume.

Trigonostemon semperflorens Muell Vern. *Dieng-soh-pyda*, *Dieng-soh-kot*, Kh.

A shrub 6-8 ft. high; branchlets tubercled, stout, hispid. *Bark* greyish brown, splitting vertically, thin; blaze brown. *Leaves* variable 5-12 by 1.5-3 in. (crowded together at intervals) panduriform or oblanceolate, obscurely serrulate, sparsely ciliate, acuminate, membranous, glabrous above, sparsely pubescent on the nerves beneath; lateral nerves 12-16 on either half; base rounded or cordate; petiole $\cdot 1 \cdot 5$ in. long. *Flowers* monœcious. *Male flowers* many, purplish; sepal 5, imbricate; petals 5; disc glandular, stamens

3; anthers at the end of cylindric columns. *Female flowers* in axillary few flowered cymes or solitary; sepal 5, green, hairy; petals 5, dark purple, with white veins, glabrous. *Ovary* hispid; style with 2-fid arms. *Capsule* .3-.5 in. across, 3-lobed, sub-sessile, hispid. *Seeds* 3, mottled (light and dark brown); albumen copious; cotyledons flat, thin (not folded).

ASSAM, N. C. HILLS, SYLHET, KHASI & JAINTIA HILLS, (5,000 ft.).

Flrs. & Fr. 5-11.

28. OSTODES Blume.

Trees or shrubs. *Leaves* alternate, penninerved. *Flowers* dioecious or monœcious, fascicled in lax terminal or axillary paniced racemes; female in separate racemes or solitary in the male inflorescence. *Male flowers* ssepals usually 5, unequal, imbricate; petals usually 5 (or 6); stamens numerous (8-35) inserted on a convex or columnar receptacle; anthers dorsifixed; cells parallel; connective, broad; pistillode 0. *Female flowers* ovary 3-celled; 1 ovule in each cell; style 2-cleft. *Capsule* sub-globose, 6-ribbed, imbricately breaking up into 2-3-valved cocci; albumen fleshy; cotyledons broad. flat.

Leaves large (5-12 in. long), serrate, acuminate 1. *O. paniculata*.
 Leaves smaller (2-2.5 in. long), crenate, shortly
 acute. 2. *O. Prainii*.

1. *Ostodes paniculata* Blume Vern. Dieng-sa-la-shit-khlow, Synt.; Dieng-ja-tung, Kh. Tasichange, Duff.

A tree (40'/35'') with spreading crown (exuding reddish gum like *Bischofia javanica*); branches often with false whorls. *Bark* greyish, .3 in. thick; inside brown mottled white; wood whitish; leaf scars very prominent, tubercled. *Leaves* often crowded at the ends of branchlets, 5-12 by 3-6 in., ovate or cordate, acuminate, distantly serrate, chartaceous, dark green above, paler beneath; base truncate or rounded, 3-nerved, glandular; lateral nerves 5-7 (above basal nerves) on either half, very prominent; petiole upto 10 in. long, *Inflorescence* a panicle, hairy; flowers rosy-white, .3 in

across. *Male flowers* sepals 3; petals 4-5, unequal, shortly clawed; stamens numerous (20-35); filaments free, minutely hairy at base; anthers introrse. *Capsule* sub-globose, 3-lobed 1.25 in. long. *Seeds* globose, 1 in. across.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, SYLHET, GARO HILLS, DARRANG, NAGA HILLS, MANIPUR, KHASI & JAINTIA HILLS, (upto 4,000 ft.).

Flrs. 3-4. Fr. Rainy season.

2. *Ostodes prainii* Gandoger.

Trees, glabrous; branches divaricate. *Leaves* 2.2-4 in., broadly ovate, sub-oblong, shortly acute, shortly crenate, glaucescent beneath; base truncately attenuate. *Flowers* in narrow lax paniced racemes; rachis erect, 2-4-flowered. *Calyx* and corolla short. *Fruit* large, sub-globose or turbinate at base, .8 in. across, broadened.

ASSAM (Jaboka) (Prain No. 933). (Bull. Soc. France, 1919, LXVI, 287 (1920).

29. BLACHIA Baill.

Blachia umbellata Baill.

A shrub or a small tree, exuding mliky juice, somewhat rambling, triquetrous. *Bark* light grey. *Leaves* 3-6.5 by 1.5 in., elliptic-obovate, elliptic-lanceolate or elliptic-oblong, cuspidately acuminate, entire or undulate towards the apex, recurved, sub-coriaceous, glabrous, dark green above, paler beneath; lateral nerves slender, 7-13 on either half; base rounded or narrowed into the petiole (.2-.4 in. long). *Male flowers* umbellate; peduncle filiform, 1.3 in. long; perianth .25 in. across. *Female flowers* rather racemose; peduncle slender, 1.5 in. long; pedicels dilated towards the top; perianth .25 in. across, enlarged in fruit. *Capsule* .5 in. across, sub-globose, deeply lobed. *Seeds* oblong, mottled, .3 in. long.

NOWGONG.

Flrs. 8. Fr. 11.

30. SUMBAVIA Baill.

Sumbavia macrophylla Muell. Vern. *Laimokhau*, Kach.; *Le-lang*, Kuki,

A shrub or a small evergreen tree; stem pale brown, fairly smooth. *Bark* about .05 in. thick, leathery. *Leaves* 5-12 by 1.5 in., elliptic-lanceolate or ovate, somewhat peltate acuminate, obscurely dentate, undulate or entire coriaceous, glabrous, green above, white felted beneath; lateral nerves 7-13 on either half, prominent beneath; base rounded or cordate; petiole .6-3.5 in. long, swollen and somewhat geniculate at the top. *Flowers* in terminal androgynous rusty tomentose bracteate racemes (sparingly branched or unbranched). *Male flowers* in fascicles of 4-6, nearly sessile, supported by a triangular bract; pedicel .1-.25 in. long; sepals 5, valvate, covered with stellately hairy scales; petals 5, imbricate, ovate, .1 in. long, membranous, green; stamens many; filaments glabrous, .1-.16 in. long; anthers versatile. *Female flowers* pedicelled, in same cluster with male, solitary in each cluster; pedicels .1 in. long. *Ovary* stellately tomentose, 3-celled; styles recurved; ovules 1 in each cell. *Fruit* 2-3 lobed, .25-.4 in. across.

DARRANG, NOWGONG, N. C. HILLS, NAGA HILLS, MANIPUR.

Brandis (Indian trees) says stamens 8, but in F.B.I. it is given as about 70. U. Kanjilal in his field note says upto 60. I have examined some flowers. I notice that the stamens are numerous.

Flrs. Cold season. Fr. 4-5.

31. MANIHOT Tourn ex Adans.

Manihot utilissima Pohl. Vern. *Simal-alu*, Cach.; *Dieng-phan-kah*, Kh. Cassava.

A shrub. *Leaves* palmately 5-6 lobed, membranous, finely pubescent beneath; lobes oblanceolate, 3-7 by .75-1.5 in., petiole 6-12 in. long, usually reddish.

CACHAR, KHASI HILLS, GARO HILLS.

Cultivated. Run wild.

The roots yield Cassava starch and Tapioca meal and form a valuable food stuff, specially in Garo Hills.

M. Glaziovii Muell. Arg. Ceara rubber, Eng.

A middle sized tree. *Leaves* almost peltate, 6-10 in. in diameter, orbicular, glabrous, palmately deeply cleft; lobes elliptic-oblong or ovate-oblong, acute; petiole 2-6 in. long. *Flowers* large in terminal panicles; calyx campanulate; stamens 10, 5 short, 5 long. *Capsule* about 1 in. across, obscurely 6 grooved, pendulous.

A native of Ceara (Brazil). Cultivated. DARRANG, N. C. HILLS.

Yields the Ceara rubber.

32. HEVEA Aubl.**Hevea brasiliensis** Muell. Arg. Para rubber.

A large evergreen tree. *Bark* greyish. *Leaves* 3-foliate; leaflets entire, acuminate. *Flowers* monœcious, in large pubescent lateral panicles. *Perianth* simple, campanulate, 5-6 cleft. *Anthers* adnate to a central column. *Capsule* large, 6-valved, 3-lobed. *Seeds* spotted, shining.

Cultivated in N. C. Hills, (Lallacherra).

Yields the best caoutchouc of Brazil (Para rubber).

33. GELONIUM Roxb.

Gelonium multiflorum A. Juss. Vern. *Midouma-baphang*, Kach.; *Theng chek-te*, Kuki; *Martu-kelok-arong*, Mik.

A middle-sized tree (45'/51"). *Bark* greyish, tubercled, closely vertically fissured, horizontally wrinkled, thick; inside uniformly light-brown, granular. *Leaves* 3-9 by 1.5-3.5 in., oblong, elliptic-oblong or oblong-lanceolate, blunt, usually entire, coriaceous, glabrous, pellucid dotted; lateral nerves 7-10 on either half; base cuneate or narrowed into the petiole which is .1-.3 in. long. *Flowers* yellowish, fragrant, in pedunculate contracted cymes or clusters. *Perianth* simple, 5-6, imbricate. *Male flowers* .3-.5 in. across; stamens numerous (40-60); disk 0. *Female* disk cupular; ovary 2-4-celled. *Fruit* globose, about .75 in. across, obscurely 3-lobed, blackish when ripe, tardily dehiscent, the valves spreading from a persistent axis. *Seeds* arillate. (Brandis).

NOWGONG, N. C. HILLS.

Fruits are eaten.

Flrs. 3-4. Fr. 4-5.

34. CHÆTOCARPUS Thwaites.

Chætocarpus castanocarpus (Roxb) Thwaites. Vern. *Chambusi-buphang*, Kach.; *Bulkokra*, Beng.

A middle-sized evergreen tree. *Bark* greyish, warty, .16 in. thick; inside dark brown, fibrous. *Leaves* 2.5-6 by 1-2 in.. alternate, ovate-elliptic or ovate-oblong, acute or acuminate, quite entire, coriaceous, glabrous, glossy; lateral nerves 7-12 on either half; base usually rounded; petiole .02-.3 in. long, *Flowers* diœcious, small, in axillary clusters; perianth simple. *Male flowers* sepals 4-6, imbricate; disk lobed; stamens 8; filaments connate into a column near the base. *Female flowers* sepals 4. *Ovary* 3-celled; ovules 1 in each cell; styles 2-fid. *Capsule* sub-globose, .75-1 in. long, echinate (spines twany, brittle) of 2 3-valved cocci; albumen fleshy; cotyledons broad, flat.

N. C. HILLS, CACHAR, SYLHET, KHASI & JAINTIA HILLS, (1,000 ft.).

Flrs. 11-12. Fr. 2-3.

35. BALIOSPERMUM Blume.

Shrubs or undershrubs. *Leaves* alternate, toothed or lobed, biglandular at the base. *Flowers* small, monœcious or diœcious, paniced or racemed; perianth simple. *Male* sepal 4-6, concave, imbricate; disk 4-6-lobed; stamens 10-30; filaments mostly free; anther-cells diverging, adnatè to the broad connective which is continuous with the filaments; pistillode 0. *Female* sepals 5-6, lanceolate, sometimes accrescent in fruit; disk almost entire. *Ovary* 3-celled; ovule solitary in each cell; style long, stout, 2-fid; stigmatic surfaces not fimbriate. *Capsule* of 3 2-valved, crustaceous cocci. *Seeds* ovoid; albumen fleshy; cotyledons flat, broad.

Flowers monœcious :—

Stamens 15-20 :—

Female perianth segments not accrescent in fruit, pubescent. 1. *B. montanum*.

Stamens 14 :—

Female perianth segments accrescent in fruit, glabrous. 2. *B. Meeboldii*.

Flowers diœcious :—

Leaves uniform :—

Calyx accrescent :—

Ovary glabrous :—

Petiole 1-2 in. long. 3. *B. sinuatum*.

Ovary strigose :—

Petiole 2-4 in. long. 4. *B. calycinum*.

Calyx not accrescent :—

Lateral nerves 8-16 on either half :—

Sepals ovate-lanceolate :—

Herb. 5. *B. micranthum*.

Lateral nerves 5-8 on either half :—

Sepals lanceolate :—

Undershrub. 6. *B. suffraticosum*.

1. *Baliospermum montanum* (Willd.) Muell. Arg. =
B. axillare Bl. Vern. *Phan-thap*, Garo; *Phul-jelang*, Ass.;
Lasam-dumuin, Kh.

A sparingly branched stout undershrub. *Bark* brownish, fairly smooth. *Leaves* very variable, 2-7 by 1-4 in. (the lower leaves often much larger) lanceolate, ovate-oblong or broadly ovate, irregularly sinuate, dentate, sometimes 3-5 lobed, acute or acuminate, coriaceous, glabrous, dark green above, minutely hairy beneath; lateral nerves 5-7 on either half; base rounded, cuneate or shallow cordate, biglandular; petiole sometimes as long as the blade; stipules of 2 glands. *Flowers* monœcious. in numerous axillary racemes or short panicles, all male or a few females below. *Male* calyx-segments almost glabrous, sub-orbicular, membranous, finely mottled; disk of 6 glands; stamens 15-20. *Female* calyx-segments ovate-lanceolate, pubescent (not accrescent in fruit); disk entire. *Ovary* hairy. *Capsule* .3-.5 in. long, obovoid, 3-lobed.

NOWGONG, DARRANG, KAMRUP, GARO HILLS, KHASI & JAINTIA HILLS.

Flrs. & Fr. Throughout the year.

2. *Baliospermum Meeboldii* Pax & K. Hoffm.

Shrub 6-8 ft. high; branches fistulose, terete; young shoots glabrous. *Leaves* 4.3-6 by 1.2-2 in., oblong-lanceolate, caudate-acuminate, sinuately dentate, membranous, sparsely sub-setulosely pilose on both sides; lateral nerves

7-9 on either half; base acute or rounded, biglandular. *Flowers* monœcious. *Male* inflorescence axillary; peduncles 1.5-4 in. long, slender; flowers .15 in. across; pedicels capillary, .09 in. long; sepals orbicular, glabrous; stamens 14; disc glandular. *Female* inflorescence 1.5-3 in. long; flowers .05-.12 in. across, somewhat bluish; pedicels capillary, .09 in. long; sepals 5, .09 in. long, lanceolate, acute, glabrous, accrescent, recurved; disc annular, hypogynous; *Ovary* glabrous; style short, rather thickened, bipartite. *Capsule* glabrous, tridymous, .25 by .17 in.

MANIPUR (3,500-4,500 ft.). (Pflanzenreich IV, 147, VII, p. 414).

3. *Baliospermum sinuatum* Muell. Arg.

A shrub, almost glabrous. *Leaves* 6-8 by 1.5-3 in., ovate-oblong or narrow-oblong, sinuate, toothed, often 3-5-lobed above the middle, acuminate, coriaceous, glabrous; base biglandular, acute or rounded; petiole 1-2 in. long (upper leaves almost sessile). *Flowers* whitish, diœcious; racemes interrupted. *Male flowers* in long narrow racemes; calyx-segments 4-5, orbicular, membranous, glabrous; stamens 20. *Female flowers* calyx-segments 5, ovate-lanceolate, glabrous, unequal. *Ovary* glabrous; fruiting calyx accrescent.

UPPER ASSAM, N. E. F. TRACT.

Flrs. 10. Fr. Cold season.

4. *Baliospermum calycinum* Muell. Arg.

A shrub; young parts finely pubescent. *Leaves* 6-10 by 2-4 in., elliptic, obovate or oblong, acuminate, serrate, sinuately toothed, coriaceous, glabrous above, finely pubescent beneath; lateral nerves 10-14 on either half; base acute or rounded, biglandular or bi-auriculate; petiole .5-3.5 in. long. *Flowers* diœcious, paniced. *Male flowers* panicles much branched, longer than the leaves, long peduncled; bracts minute or obsolete; calyx-segments orbicular, concave, membranous; disk of fleshy glands; stamens 20. *Female flowers* panicles shorter, corymbiform; bracts leafy; calyx-segments 5, linear-lanceolate, accrescent in fruit. *Ovary* strigose. *Capsule* 1-3 in. across.

UPPER ASSAM, N. E. F. TRACT, KHASI & JAINTIA HILLS, (5,000 ft.).

Flrs. 9. Fr. 12.

5. *Baliospermum micranthum* Muell. Arg. Vern. *Thilli-ski*, Kh.

A slender herbaceous bush; young parts finely pubescent. *Leaves* 3-5 by .5-2 in., lanceolate or oblong, acuminate, sinuate-toothed, coriaceous, membranous, glabrous; lateral nerves 8-16 on either half; base 2-glandular, acute or rounded. *Flowers* diœcious, paniced; pedicels capillary. *Male flowers* sepals orbicular, hyaline; disk of fleshy glands; stamens about 16. *Female flowers* sepals ovate-lanceolate. *Capsule* sub-globose, .3 in. across, smooth, tridymous.

KHASI & JAINTIA HILLS, (4-5,000 ft.).

Used as vegetable.

Flrs. 6-9. Fr. Cold season.

6. *Baliospermum suffruticosum* Pax & Hoffm.

An undershrub; stem woody, rhizomatous. *Leaves* 3-5 by 1-2 in., lanceolate or elliptic, caudate-acuminate, sinuately denticulate or sub-incisely dentate, membranous, glabrous; lateral nerves 5-8 on either half; base acute, biglandular; petiole .4-1.6 in. long, slender. *Flowers* diœcious. *Calyx* not accrescent, segments lanceolate, acuminate, .8-1.2 in. long. *Capsule* .3 by .16 in., glabrous, tridymous; pedicel .2-.5 in. long, erect.

MANIPUR, (5,300 ft.). (Meebold No. 7437). (Pflanzenreich IV, 147, VII, p. 414).

36. ENDOSPERMUM Benth.

***Endospermum chinense* Benth.** Vern. *Bola*, Ass.; *Paklou-arong*, Mik.; *Haludchaki*, Cach.; *Thing-aiveng*, Kuki.

A tree. *Bark* greyish, fairly sessile; blaze pale yellow with brown granules. *Leaves* 2-7.5 in., alternate, broadly ovate or sub-orbicular, often sub-peltate, obtuse, entire, coriaceous, glabrous, puberulous on the nerves beneath; basal nerves 3-5; lateral nerves (above basal) 3-5 on either half,

arcuate, prominent beneath; base rounded or truncate with 2 large glands beneath at the apex of the striate petiole which is 1.5 in. long. *Flowers* small, diœcious, in long axillary or lateral, simple spikes or racemes, perianth simple. *Male flowers* sub-sessile, clustered; calyx globose; segments 4, unequal, valvate; disk shortly lobed; stamens 6-10 on a convex or conical receptacle; filaments short; anthers didymous. *Female flowers* solitary, pedicelled; calyx 5-toothed; disk obscure. *Ovary* 2-3-celled; ovule 1 in each cell. *Fruit* didymous, tubercular, about .5 in. across, separating into 2 indehiscent cocci. *Seeds* globose; testa rugose. .

Common throughout the province.

Flrs. 4-5. Fr. 7-8.

37. SAPIUM P. Br.

Trees and shrubs, usually with milky juice. *Leaves* alternate, entire, serrate or toothed, penninerved; petiole often biglandular at the summit. *Flowers* monœcious, in terminal, simple or paniced spikes or racemes; males above several to each bract; females solitary, lower down or in separate spikes; perianth simple. *Male flowers* calyx-segments 2-3; stamens 2-3; filaments free; anther-cells distinct, parallel. *Female flowers* calyx-segments 3. *Ovary* 2-3-celled, ovule 1 in each cell; styles free or connate at the base, spreading or recurved, undivided. *Capsule* crustaceous, fleshy or pulpy, rarely woody, ultimately 3-valved. *Seeds* globose or ovoid (not carunculate) usually long, attached to the columella; albumen fleshy; cotyledons flat, broad.

Inflorescence androgynous:—

Male calyx truncate, sub-irregularly 2-3-fid :—

Petiole-apex glandular :—

Leaves entire, orbicular, ovate or sub-rhombic (1-2.8 in. long). 1. *S. Sebiferum.*

Leaves long, ovate (2-4.8 in. long). 2. *S. eugeniæfolium.*

Petiole-apex not glandular :—

Leaves entire, long petiolate, ovate or ovate-lanceolate. 3. *S. baccatum.*

Inflorescence unisexual :—

Male calyx bifid; female 2-3 partite :—

Leaves long, elliptic or oblong-lanceolate, serrate (5.6-7.2 in.). 4. *S. insigne.*

1. *Sapium sebiferum* Roxb. The Chinese tallow tree.

A small or middle-sized deciduous tree. *Bark* greyish or greyish brown with shallow longitudinal cracks. *Leaves* 2-3 by 1.5-2 in., sub-rhomboid or orbicular-ovate, acuminate, entire, sub-coriaceous, glabrous, glaucous beneath; petiole as long as the blade, biglandular at the apex. *Flowers* greenish yellow; anthers exserted. *Ovary* glabrous; style connate at the base; stigma recurved. *Capsule* .3-.5 in. across, sub-globose, shortly pointed. *Seeds* 3, enclosed in an arillus of white fatty substance.

A native of CHINA, cultivated.

The white fatty substance enclosing the seeds (vegetable tallow) is separated by boiling in water and made into candles in China and Japan.

Wood is even-grained. Weight 32 lbs. per c.ft.

The foliage somewhat resembles *Sissoo*.

Flrs. 6-8. Fr. 10-12.

2. *Sapium eugeniæfolium* Ham. Vern. *Dieng-soh-mrit*, Kh.; *Korha*, Ass.; *Torso*, Mik.; *Simung-Puktu*, Abor.

A middle-sized tree (50'/60'). *Bark* greyish, fairly smooth with horizontal wrinkles, .25 in. thick; inside light brown and fibrous, mottled; wood white. *Leaves* 2-6.5 by 1-2.5 in., ovate or elliptic, acute or sub-acute, rather sub-coriaceous, entire, glabrous, often glaucous beneath; lateral nerves 6-10 on either half; base rounded; petiole 1-4 in. long, biglandular at the apex. *Racemes* dense, 3-4 in. long. *Capsule* sub-globose, .4-.5 in. across, woody. *Seeds* globose.

Common throughout the province.

Endi silk worms feed on the leaves.

Flrs. 5-6. Fr. 10-1.

3. *Sapium baccatum* Roxb. Vern. *Seleng*, Lawa, Ass.; *Dieng-ja-long-ehr*, Kh.; *Sam-sim*, Garo; *Pantula*, Jharua; *Tor-arong*, Mik.; *Japhang*, Kuki; *Dhumra*, Sarong-phang, Mech; *Puktu-asing*, Abor; *Thing-bok-pui*, Lush.; *Boloch*, Cach.

A middle-sized or large evergreen tree (90'/120'), glabrous. *Bark* greyish or greyish brown, closely vertically

fissured, $\cdot 2\cdot 4$ in. thick; inside cream-coloured or light chocolate in old trees. *Leaves* young orange coloured, old yellowish, 2-6 by 1-4 in., ovate or ovate-lanceolate, acuminate, entire, sub-coriaceous, glabrous above, glaucous beneath; lateral nerves 8-12 on either half; costal nerve with a gland about half way; base rounded; petiole red, 1-4-5 in. long. *Flowers* in spiciform paniced racemes, minute, yellowish-white; bracts ovate, acute, biglandular. *Stamens* 2, included; anthers red, usually didymous. *Stigma* revolute. *Fruit* reddish, berry-like, $\cdot 3\cdot 5$ in. across.

Common throughout the province.

The wood is used for packing boxes. The fruit is eaten greedily by pigeons.

Flrs. 4-6. Fr. 8-11.

4. *Sapium insigne* Benth. Vern. Mah-kola, Ass.

A middle-sized, often a large deciduous tree, glabrous. *Bark* grey corky, deeply reticulately cracked; inside brown, coarsely fibrous with copious milky juice. *Leaves* often crowded towards the ends of branchlets, 5-12 by 2-3 in. (Assam specimen 1-4 by $\cdot 5\cdot 1\cdot 5$ in.) elliptic or oblong-lanceolate, acuminate, crenate-serrate, soft, glabrous; lateral nerves 7-16 on either half, slender; base acute, often unequal sided; petioles 1-2 in. long, biglandular at the apex. *Spikes* terminal, fleshy, unisexual. *Male flowers* sessile, inrounded clusters subtended by 2-fleshy ovate green bracts; sepals 2, orbicular, concave; stamens 2; filaments short. *Female flowers* sessile or almost so; sepals ovate, acuminate. *Ovary* glabrous; style short, slightly connate at base. *Capsule* ovoid, $\cdot 3\cdot 5$ in. across, numerous on a fleshy rachis.

DARRANG, KAMRUP, NOWGONG.

Flrs. Cold season. Fr. Hot season.

38. EXCŒCARIA Linn.

Trees or shrubs, glabrous with acrid milky juice. *Flowers* diœcious or monœcious, in lateral axillary or terminal unisexual or androgynous spikes or racemes. *Parianth* simple; male 1-3 in each bract, 2 bracteolate; females at the base of the racemes or in separate racemes, rachis with large

glands. *Male flowers* sepals 3, small, sub-equal; disk 0; stamens 3; filaments free; anthers didymous; cells globose, distinct, contiguous. *Female flowers* calyx 3-partite. *Ovary* 3-celled; ovules 1 in each cell; styles short, connate below, spreading and recurved above, entire. *Capsule* of 3 cocci, separating from the columella with elastically twisted valves. *Seeds* sub-globose or 3-gonous; strophiole 0; albumen fleshy; cotyledons broad, flat.

Leaves alternate :—

Spikes androgynous :—

Leaves membranous, serrate. 1. *E. acerifolia*.

Leaves opposite :—

Spikes unisexual :—

Leaves coriaceous, usually entire. 2. *E. oppositifolia*.

1. *Excœcaria acerifolia* F. Didrichs. Vern. *Dieng-Blei-khlaw*, Kh.

A shrub. *Bark* greyish smooth with scattered lenticels; wood whitish. *Leaves* alternate, 2·5-7·5 by 1-2 in., elliptic-lanceolate or oblong, acuminate, crenate-serrate, membranous, glabrous, deep glossy green; lateral nerves 6-10 on either half; petiole 2-5 in. long. *Spikes* androgynous. *Capsule* 5-6 in. across, 2-3-lobed. *Seeds* ovoid, smooth 2 in. long.

KHASI HILLS, (4,500 ft.).

Flrs. 3-7. Fr. 7-12.

2. *Excœcaria oppositifolia* Griff. Vern. *Dieng-jam*, Kh.; *Dudhgoch*, Ass.; *Theng-bri*, Mik.

A small tree (50'/18"). *Bark* greyish-white, 25 in. thick; blaze reddish; wood whitish. *Leaves* opposite, 4-13 by 2-4 in., lanceolate or narrow-oblong, acuminate, entire or subserrate, coriaceous, glabrous; lateral nerves 12-20 on either half, conspicuous beneath. *Spikes* unisexual; male spikes slender, terminal, 4-6 in. long; bracts entire, 1-flowered; sepals toothed. *Male flowers* sepal free; base auricled. *Female flowers* solitary. *Fruit* orbicular.

KHASI & JAINTIA HILLS, NOWGONG, SIBSAGAR, SYLHET.

The acrid milky juice is said to be violently poisonous and corrosive.

Flrs. 4. Fr. 12.

Excœcaria Sp. Nov. Vern. *Gammang-asing*, Abor.

The following description is given from the field notes of the late Rai Bahadur U. N. Kanjilal :—

A tree (30'/28"). *Bark* grey, with very fine vertical fissures, .2 in. thick; inside white but reddish near cambium; wood white; milky juice copious. *Leaves* alternate, 6-13 by 3.5-7 in., broadly oblong or rotundate, acute, obtuse or shortly acuminate, entire, coriaceous, glabrous; base rounded or obtuse; lateral nerves 12-15 on either half, almost parallel, very prominent beneath; petiole .4 in. long. *Inflorescence* terminal; flowers unknown. *Capsule* inflated, 1.5-2 in. long. *Seed* globose, brownish, .6 in. across.

This is a new species which could not be matched either at Sibpur or Kew. Flowering specimens are wanting, but an attempt is being made to collect them.

Pasighat (580 ft.). (N. E. F. TRACT). Sheet no. 3193 of U. N. Kanjilal. Also collected at Parashuramkunda by R. N. De.

Fr. 12 (mature).

39. ACALYPHA Linn.

Herbs, shrubs or trees. *Leaves* alternate, usually crenate or toothed. *Flowers* minute, usually monœcious, in axillary or terminal racemes or female 1-2 in pedunculate solitary bract; male ebracteate; perianth simple. *Male* sepals 4, valvate; disk 0; stamens usually 8 on a convex receptacle; filaments short; anther-cells divaricate; pistillode 0. *Female* sepals 3-4, minute, imbricate. *Ovary* 3-celled; one ovule in each cell; style filiform, long, lanceolate or fimbriate. *Capsule* of 3 minute 2-valved, crustaceous cocci. *Seeds* sub-globose; albumen fleshy; cotyledons broad, flat.

Female bracts not solitary :—

Bracts concealing the capsule :—

Bracts obscurely toothed, almost truncate,
somewhat 3-nerved. 1. *A. indica*.

Bracts 3-lobed, obscurely 7-nerved. 2. *A. brachystachya*.

1. *Acalypha indica* Linn.

An annual. *Leaves* 1-3 by .8-2 in., ovate or rhomboid-ovate, acute or obtuse, crenate-serrate, membranous, glabrous,

somewhat 3-nerved at base which is cuneate; petiole as long or longer than the blade. *Flowers* of male and female in axillary spikes, the male upper most and few. *Male flowers* minute, followed by a tuft of sterile flowers; bract .2-.3 in. long, leafy, broad, crenate, 3-5 flowered.

ASSAM. (F.B.I., Vol. 5, p. 416).

Flrs. & Fr. 7-11.

2. *Acalypha brachystachya* Hornem.

A herbaceous slender flaccid annual. *Leaves* 1-3 by .6-1.8 in., ovate, acute or acuminate, crenate-serrate, membranous, hispid, obscurely 5-7-nerved at base which is shallow-cordate or rounded; petiole .8-2 in. long, very slender. *Flowers* usually monœcious, in axillary short spikes; bract 3-5-lobed, .15-.3 in. *Calyx* in male flowers of 4 minute valvate membranous lobes, in female of 3-4 imbricate lobes. *Petals* 0. *Stamens* about 8; filaments short, free; anther-cells distinct, divaricate. *Ovary* 3-celled. *Capsule* hispid, .1-.2 in. long. *Seeds* globose, .06 in. across.

KHASI HILLS (upto 4,000 ft.). (F.B.I., Vol. V, p. 416).

Flrs. & Fr. 6-11.

40. CLAOXYLON A. Juss.

Claoxylon khasianum Hk. f.

A shrub or small tree. *Leaves* 4-10 by 3-8 in., alternate, elliptic or oblong-lanceolate, acuminate, obscurely serrate or toothed, membranous, scaberulous when young, glabrous when mature; lateral nerves 6-8 on either half, quite distinct; transverse veins remote, more or less parallel; base rounded or obtuse; petiole 1-4 in. long. *Flowers* minute, sessile, usually diœcious; racemes hoary, 1-3 in. long. *Male flowers* calyx-segments 3-4, valvate; petals 0; disk 0; stamens numerous inserted on central receptacles with minute glands or scales; filaments free, mixed with very small scales; anthers erect; cells distinct, connate at the base only. *Female flowers* ovary 3-celled; styles short, entire, plumose; ovules 1 in each cell. *Fruit* of 1-3 globose, membranous, hoary

carpels, .5 in. across. *Seeds* .25 in. across; testa crustaceous; cotyledons broad, flat; albumen fleshy.

N. E. F. TRACT, NAGA HILLS, CACHAR and KHASI & JAINTIA HILLS (4,000 ft.).

Flrs. 2. Fr. Rainy season.

C. longipetiolatum Kurz.

It is a shrub 10-12 feet high with thick fleshy branches. KHASI & JAINTIA HILLS.

(U. N. Kanjilal's No. 6143. There is only a fragmentary specimen in the herbarium which matches with *C. longipetiolatum* Kurz.).

C. leucocarpum Kurz.

Leaves broadly ovate, 10-12 in. long, and as broad; base 3-nerved; petiole 3-8 in. long.

(There is only a leaf specimen in the herbarium. U. N. Kanjilal's No. 2846 which matches with *C. leucocarpum* Kurz.).

Mercurialis leiocarpa Sieb et Zucc.

DELEI VALLEY (Kingdon Ward 8078) 7-8,000 ft.

Flrs. 4.

41. **ALCHORNEA** Swartz.

Alchornea tiliæfolia Muell. Arg. Vern *Lobong-long-arong*, Mik.

A shrub or a small tree; young parts minutely pubescent. *Bark* greenish grey. .06 in. thick, greenish-yellow; inside soft. *Leaves* 3-8 by 1.5-8 in., alternate, orbicular or broad-ovate, acuminate, dentate or serrate, membranous, dotted, pubescent on the nerves; lateral nerves 4-6 on either half; base truncate, rounded or cordate; petiole 5-5.5 in. long. *Flowers* small, clustered, diœcious or monœcious; perianth simple; bracts minute. *Male flowers* calyx globose; segments 2-4, valvate; stamens 5-8. *Female flowers* sepals 3-4, imbricate. *Ovary* minutely tubercled; style free. *Capsule* finely pubescent, 3-lobed, .5-.6 in. long, with purplish tubercles.

NOWGONG, N. C. HILLS, SYLHET and KHASI & JAINTIA HILLS (3-5,000 ft.).

Flrs. 5-7. Fr. 8-11.

A. rugosa Muell Arg.

An undershrub. *Leaves* 6-10 by 2-5 in., oblanceolate acuminate, glandular-serrate. *Capsule* tridymous, glabrous.

LUSHAI HILLS.

A. mollis Muell. Arg.

A small tree; young parts finely pubescent or tomentose. *Leaves* 4-6 in. across, more or less orbicular, cuspidate, dentate or serrate. *Pellucid-punctate*; base rounded or cordate, with 2 large glands; *petiole* terete, stout, 2-6 in. long; *stipules* small, subulate. *Male racemes* slender, 4-6 in. long; *calyx* membranous. *Female racemes* 4-6 in. long; *calyx* eglandular; *sepals* lanceolate, pubescent. *Ovary* tomentose; *style* free. *Capsule* globose, obscurely 3-lobed, pubescent. *Seeds* rugose, dorsally compressed.

ASSAM (Martin). (F.B.I., Vol. V, p. 420).

42. TREWIA Linn.

Trewia nudiflora Linn. Vern. *Merua*, Sylh.; *Thing-chingel*, Lush.; *Marakur*, Kuki; *Mahou*, Mech.; *Bol-diktak*, *Bolno-khap*, *Jongchia*, *Arurong*, Garo; *Bhel-kol*, *Kenlo*, *Pithakuma-kendlow*, Ass.; *Thekijoy-arong*, Mik.; *Dieng-soh-lyndot*, Kh.; *Panipitha*, Kach.; *Pithakuma*, Hajong.

A middle-sized deciduous tree; young parts deciduous-tomentose. *Bark smooth*, greyish or brownish, with wrinkles; inside light pinkish, faintly striated. *Leaves* 2-8 by 2-5 in., opposite, broadly ovate-cordate, acuminate, entire, subcoriaceous, glabrescent; lateral nerves 4-6 on either half; base cordate or truncate; *petiole* .5-3 in. long; *stipules* minute, acute, caducous. *Flowers* diœcious, greenish-yellow; male in long racemes; *pedicels* short, jointed; female in long peduncles (about 1-3 in.), *perianth* simple. *Male flowers* .3-.5 in. across; *sepals* concave, valvate; *stamens* numerous, free. *Female flowers* solitary or 2-3 together; *sepals* 3-5, broad, imbricate, caducous. *Ovary* woolly, 3-4 celled; *style* .5-.7 in. long, yellow, stigmatic throughout. *Fruit* woody, globose, 1-1.5 in. across, smooth, with pale dots; *endocarp* crustaceous. *Seeds* smooth, polished, blackish; *albumen* fleshy.

Common throughout the Province.

Wood white, soft, fairly elastic; weight 28-29 lbs. per cft. used for drums in U.P.; suitable for matches.

Flrs. 1-3. Fr. 7-8.

43. MALLOTUS Lour.

Trees or shrubs. *Leaves* opposite or alternate, entire or 3-lobed, penninerved or 3-7-nerved, sometimes peltate, often gland-dotted beneath and sometimes with glandular spaces at the base above. *Flowers* diœcious or monœcious, in axillary or terminal simple or paniced racemes or spikes; perianth simple; male usually fascicled; female solitary (or few-?) under each bract. *Male flowers*-calyx globose or ovoid, separating into 3-5 valvate segments; disk 0; stamens numerous, crowded on the flat or concave receptacle; filaments free; anther-cells parallel, separated by a wide connective. *Female flowers*-calyx spathaceous or valvately 3-6-cleft or partite; disk 0 or small. *Ovary* 2-4-celled; ovule solitary in each cell; style spreading or recurved above, entire, plumose or papillose. *Fruit* a capsule usually, glandular, of 2-3- (rarely 4) two-valvad cocci, tubercled, echinate, paleaceous or smooth. *Seeds* ovoid, oblong or globose; testa crustaceous; albumen fleshy; cotyledons flat.

Capsule echinate or tubercled :—

Leaves orbicular or broadly ovate, usually alternate :—

Leaves peltate :—

Leaves 3-5-nerved :—

Capsule tubercled. 1. *M. albus*.

Leaves 7-9-nerved :—

Capsule hairy and prickly. .. 2. *M. Roxburghianus*.

Leaves not peltate :—

Leaves yellow dotted beneath; base usually truncate, rarely sub-cordate :—

Capsule tomentose. 3. *M. nepalensis*.

Leaves eglandular beneath; base usually acute :—

Capsule prickly. 4. *M. khasianus*.

Capsule smooth :—

Basal nerves 3 :—

Leaves 4-9 in. long :—

Capsule 3-lobed. 5. *M. philippinensis*.

Leaves 2-4 in. long :—

Capsule didymous. 6. *M. repandus*.

1. Mallotus albus Muell. -Arg. Vern. *Laru-bandha*, *Moralia*, Ass.; *Laimaguphu*, Kach.; *Napol-thing*, Kuki;

Dieng-laklia, *Dieng-thai-rong*, Kh.; *Lutung-har-arong*, Mik.; *Teng-niam-ching*, Naga; *Marli*, Sylh.; *Khurchup*, Tipp.

A middle-sized tree; young parts stellate-tomentose. *Bark* greyish white, warty, with fine vertical lenticels, .16-.2 in. thick; blaze greenish-brown. *Leaves* mostly alternate, 4-12 by 2-8 in., broadly ovate or sub-orbicular, acuminate, entire or sinuate-toothed, coriaceous, glabrous above, whitish or rusty-tomentose beneath, 3-5-nerved at base; lateral nerves 3-6 (above basal); base narrowly peltate or truncate; petiole 1-8 in. long. *Flowers* diœcious, in axillary and terminal pyramidal panicles. *Male flowers* clustered; buds globose; anther-cells parallel. *Female flowers* solitary; calyx 4-5-cleft. *Ovary* densely stellate-hairy; styles 4-5, papillose. *Capsule* usually of 4 cocci, muricate, with soft short tomentose processes. *Seeds* blackish-brown, minutely tubercled.

Common throughout the Province.

Flrs. 2-3. Fr. Cold season.

2. *Mallotus Roxburghianus* Muell. Arg. Vern. *Bolthathu*, Garo; *Gurji-phang*, Kach.; *Khab-i-lakoi*, Manip.; *Tamlai*, Naga; *Laidolor-bomphang*, Mëch; *Arlak-arong*, Mik.; *Buri-tokon*, Ass.; *Dieng-long-kharai*, Kh. . .

. . . A shrub or small tree. *Bark* greyish or greyish-brown, dark greenish-brown underneath the corky layer; inside finely fibrous. *Leaves* 3-7 by 2-6 in., alternate, peltate, ovate or sub-orbicular, long-tailed or acuminate, remotely glandular toothed, coriaceous, pubescent with simple and stellate hairs on both surfaces, with scattered yellow gland dots beneath; 8-10 nerves radiate from the extremity of the petiole, and 4-5 on either half of the midrib above the basal; base rounded; petiole 1-3.5 in. long. *Racemes* stout, 6-12 in. long. *Male flowers*-calyx segments 5, valvate, reflexed in open flower; disk 0; stamens 30 (33?); anthers 2-celled; pistillode 0. *Female flowers*-calyx segments lanceolate. *Capsule* .5 in. across, 3-lobed, 3-seeded, covered with hairy processes and yellow resinous glands; young fruit echinate. *Seeds* smooth, subglobose.

KAMRUP, GOALPARA, NOWGONG, N. C. HILLS, CACHAR
and KHASI & JAINTIA HILLS.

Flrs. 12. Fr. 5.

3. *Mallotus nepalensis* Muell. Arg. Vern. Dieng-lakhar, Kh.

A small tree (30'/30''); young parts rusty-tomentose. *Bark* greyish-brown, shallowly reticulately furrowed, .25 in. thick; inside light red, gradually cream-coloured towards the cambium layer, with faint or irregular transverse white streaks. *Leaves* 3-8 by 2-7 in., opposite or alternate, broad-ovate or sub-orbicular, caudate-acuminate, entire, sub-coriaceous, stellate-tomentose beneath, ultimately glabrescent, yellow-dotted beneath; lateral nerves 3-7 on either half above the basal; base 3-nerved, truncate, rarely sub-cordate; petiole 1-7 in. long. *Male* racemes very long; flowers large; female shorter, stout. *Male flowers* .25 in. across; stamens numerous. *Female flowers* sepals narrow. *Ovary* shaggy-tomentose. *Capsule* .5 in. across, tomentose, bristly, densely crowded.

KHASI HILLS (4-5,000 ft.).

Flrs. 6. Fr. End of rainy season.

4. *Mallotus khasianus* Hk. f.

A small tree, glabrous (except the inflorescence); young parts stellate-tomentose. *Leaves* 4-10 by 2-3.5 in., elliptic, ovate-oblong or lanceolate, caudate-acuminate, entire or sinuate, toothed, thinly coriaceous, eglandular beneath; lateral nerves 6-9 on either half, slender; base rounded or broadly cuneate; petiole .7-1.5 in. long; stipules triangular, lanceolate, stellately tomentose. *Male flowers* clustered in racemes, which are 3-6 in. long; bracts broad-ovate; calyx tomentose; segments 3, unequal; stamens 40-50. *Female flowers* pedicelled, in long slender racemes (6-8 in. long). *Capsule* .75 in. across, covered with slender prickles. *Seeds* .3 in. long, subglobose, brown, shining.

KHASI HILLS (3-4,000 ft.).

Flrs. & Fr.

5. Mallotus philippinensis Muell. Arg. Vern. *Bondauthu*, Kach.; *Sindure*, Nep.; *Yaduk-changne*, Duff.; *Jorat*, Losan, Ass.; *Dieng-chandon*, Kh.; *Sindur-phang*, Mech; *Arlak-arong*, Mik.; *Kage-em-bang*, Naga; *Bol-khing-khang*, Garo.

A small evergreen tree, occasionally a mediocre; young branches rusty. *Bark* thin, greyish-brown or darkish-grey, somewhat rough, with wrinkles about 3 in. apart; blaze red, with white vertical lines; wood very hard, cream-coloured. *Leaves* 3-7 by 1·5-2·5 in., alternate, ovate, ovate-oblong or lanceolate, acuminate, entire or slightly dentate, glabrous above, pubescent beneath and with numerous close-set orbicular red glands; lateral nerves 3-7 on either half (above base), 3-nerved at base; reticulation distinct; base rounded or acute; petiole ·5-3·5 in. long, rusty-pubescent with a pair of glands at the junction with the blade. *Inflorescence* brown or red. *Flowers* small, diœcious. *Male flowers* clustered in erect terminal spikes which are often paniced, sessile or almost so; bracts broad-ovate, acute; sepals 4 (rarely 5), lanceolate, acute; stamens numerous; anther-cells globose. *Female flowers* usually solitary, sessile or nearly so in short spikes; sepals almost free, 3-4, ovate-lanceolate. *Ovary* 3-celled, with red glands; style 3, simple, papillose. *Capsule* ·3-·5 in. across, 3-lobed when ripe, covered with a crimson powder, consisting of stellate hairs and grains of resinous substance. *Seeds* globose, black, ·16-·2 in. across.

Common throughout the area.

Wood used for fuel. Weight 48 lbs. per cft.

The crimson powder *Kamela* which covers the ripe fruit is used for dyeing silk and is also used medicinally and is considered efficacious for tape-worm.

Flrs. 8-11. Fr. 3-5.

6. Mallotus repandus Muell. Arg. Vern. *Konibih*, *Dudloti*, Ass.; *Rikhang-bong-long*, Mik.

A large woody climbing or straggling bush; arrested branchlets spinescent; young parts fulvous-woolly-tomentose. *Leaves* alternate, 1·5-4 by 1-3 in., broadly deltoid or rhomboid-ovate, acute or shortly acuminate, subentire or remotely

sinuate toothed, membranous, glabrescent when mature, yellow gland-dotted beneath; base 6-nerved, truncate, retuse or cuneate; petiole .5-2 in. long. *Flowers* diœcious, tomentose. *Male flowers* clustered in racemes 2-6 in. long, which are crowded at the ends of shoots or axillary; bracts linear-lanceolate; calyx globose; segments 3-5, almost free, ovate or elliptic-acute; stamens numerous (50-60). *Female flowers* in shorter racemes, about 3 in. long; calyx campanulate; in shorter racemes, about 3 in. long; calyx campanulate; segments 4, linear-lanceolate or oblong, acute. *Ovary* glandular, densely stellate-tomentose, 2-celled; styles 2, plumose, lacinate, connate below. *Capsule* of 2 cocci, .4 in. across, didymous, crowned with persistent stigma, densely stellate, fulvous and glandular. *Seeds* globose, black, shining, .16-.2 in. across.

EASTERN DUARS (ASSAM), SIBSAGAR, NOWGONG and KHASI & JAINTIA HILLS.

Flrs. 2-3. Fr. 3-4.

44. MACARANGA Thouars.

Trees or shrubs. *Leaves* alternate, often large and peltate, entire or lobed, more or less glandular beneath; basal nerves 3 or more. *Flowers* small, usually diœcious, in axillary panicles or racemes, bracteate; perianth simple. *Male flowers* minute, in clusters; calyx globose or obovoid; segments 3-5, valvate; stamens central 1 or more (often 10-30); filaments short, free; anthers terminal, 3-4-celled; pistillode 0. *Female flowers* one or few to each bract; calyx-segments 2-4. *Ovary* 1-2-celled (rarely 1-celled by abortion); ovule solitary in each cell; style entire. *Fruit* a small capsule of 1-5 naked or echinate 2-valved cocci, often with glandular or waxy coat. *Seeds* globose; testa crustaceous; albumen fleshy; cotyledons broad, flat; embryo small.

Leaves peltate :—

Leaves denticulate :—

Ovary 2-celled :—

Stamens 6-30 :—

Capsule didymous.

..

.. 1. *M. denticulata*.

Leaves usually entire :—

Ovary mostly 1-celled :—

Stamens 6-10 :—

Capsule as a rule globose. .. 2. *M. indica*.

Leaves not peltate :—

Stamens 15-20 :—

Capsule globose, echinate. .. 3. *M. Lowii*.

1. *Macaranga denticulata* Muell. Arg. Vern. *Dieng-lakhar*, Kh.; *Jaglo*, Moralia, Ass.; *Kapu*, Naga; *Bol-ajak* or *Chhagru*, Garo; *Laijigrao*, Kach.; *Jagrabish*, Hajong, *Jagura*, Cach.; *Mallata*, Nep.; *Lakoi*, Manip.; *Nakhar*, Lush.; *Madla*, Mech.; *Duging*, Abor and Miri; *Tafai* (*Taraun*), *Ejingba* (*Midu*) Mishmi; *Garawai*, Kach.; *Jagura*, Beng.; *Jhakura*, Sylh.

A middle-sized evergreen tree, often gregarious; young parts rusty-tomentose; stem fluted. *Bark* greyish or greyish-brown, with horizontal wrinkles, .3 in. thick, dark brown or reddish inside, somewhat granular. *Leaves* peltate, 3-12 by 2.5-10 in., broad-ovate, acuminate, denticulate (when young) or entire, sub-coriaceous, glabrescent above, glaucescent and dotted with numerous red minute orbicular glands beneath; basal nerves 5-7, radiating; lateral nerves 10-12 on either side of midrib, slightly arcuate; tertiary nerves parallel; base rounded, truncate or cordate; petiole 2-8 in. long; stipules small, fugacious. *Male panicles* slender, 4-6 in. long, each bract subtending a cluster of 5-8 pubescent flowers; calyx-segments 2-3; stamens 6-30; anthers 4-lobed. *Female panicles* shorter; calyx-segments 3-4. *Ovary* 2-celled; style short. *Capsule* .25 in. across, blackish, didymous, clothed with minute waxy orbicular glands.

Very common throughout the Province.

Very good fire wood. Leaves buffalo fodder.

Flrs. 2-3. Fr. 5-7.

2. *Macaranga indica* Wight. Vern. *Jaglo*, Ass.; *Dieng-lakhar*, Kh.; *Lobong-long-arong*, Mik.; *Boldotru* or *Sangrow*, Garo.

A middle-sized tree (62'/64"). *Bark* greyish, smooth, yellowish inside. *Leaves* peltate, 5-12 by 4-9 in., triangular-

ovate, orbicular-ovate, acuminate, obscurely denticulate or entire, thinly coriaceous, ultimately glabrous above, glabrate and clothed with viscid yellow glands beneath and minutely pubescent specially on the nerves; lateral nerves 8-11 on either half above the basal pairs which are penninerved; petiole 2-12 in. long, glaucous with a pair of glands at the summit; stipules .5 in. long, ovate, acuminate. *Male panicles* branches zigzag; flowers pubescent, somewhat clustered; bracts fleshy with glandular appendages; sepals ovate, 2-3; stamens 6-10. *Female panicles* smaller, hairy; flowers pedicelled; bracts small, glandular; calyx 4-cleft. *Ovary* mostly 1-celled; stigma spurred, densely clothed with orbicular waxy glands. *Capsule* .16-.2 in. across, globose, rarely didymous. *Seeds* globose.

Common throughout the Province.

Flrs. Hot season. Fr. Cold season.

3. Macaranga Lowii King. Vern. *Naga-jegeru*. Phungi, Ass.

A large tree (80'/60''); stem slightly fluted. *Bark* blackish, smooth, with large white blotches, .16 in. thick, reddish-brown inside. *Leaves* 3-6.5 by 1-2.5 in., (not peltate) elliptic-oblong or lanceolate, acuminate, entire, thinly coriaceous, glabrous, dotted with minute orbicular scales beneath; lateral nerves 7-10 on either half, arcuate; base rounded; petiole .5-2 in. long. *Flowers* very small, in clusters. *Male bracts* triangular, acuminate; sepals orbicular; stamens 25-20; anthers 4-celled. *Female bracts* broad; sepals lanceolate. *Ovary* echinate. *Capsule* globose, .3-.5 in. across, echinate.

LAKHIMPUR (Makum Range). (Rai Bahadur U. N. Kanjilal's No. 4116).

Flrs. 2-4. Fr. Rainy season upto December.

U. N. Kanjilal mentions *M. pustulata* King in his field notes, but there is no record either in Sibpur or in Forest Herbarium, Shillong.

45. CLEIDION Blume.

Cleidion javanicum Bl. Vern. *Theng-hogwai*, Mik.; *laktar-asing*, Miri; *Aron*, Cach.; *Theng-moite*, Kuki.

An evergreen middle-sized (60'/35'') tree, glabrous. *Bark* ashy-grey, .12 in. thick; inside light chocolate, granular, somewhat mottled. *Leaves* 2·5-9 by 1-4 in., alternate, elliptic-lanceolate, acuminate, serrate or sub-entire, coriaceous, glabrous, dark green above, paler beneath; lateral nerves 7-10 on either half, prominent beneath; base acute; petioles .5-3 in. long, swollen and geniculate. *Flowers* small, monœcious or diœcious; perianth simple. *Male flowers* in long axillary racemes; calyx globose; sepals 3-4, lanceolate, valvate, reflexed, glabrous; stamens numerous on a conical receptacle; anthers 4-celled. *Female flowers* solitary, axillary; peduncles 2-3·5 in. long; sepals 3-5, imbricate, thick, ovate. *Ovary* 2-3-celled; ovule solitary in each cell; style 2, very long, each again divided into 2 filiform arms. *Capsule* large, about 1 in. across, didymous, on peduncles of 2-4 in. in length and swollen or thickened above. *Seeds* grey mottled-brown; albumen fleshy; cotyledons flat.

SIBSAGAR, N. C. HILLS, N. E. F. TRACT, LAKHIMPUR, DAR-RANG, GARO HILLS, NOWGONG and KHASI & JAINTIA HILLS, MANIPUR.

Flrs. Cold season. Fr. Hot season.

46. HOMONOIA Lour.

Homonoia riparia Lour. Vern. *Hil-kadam*, Ass.; *Takit-asing*, Miri; *Lari*, *Panihelos*, Ass.; *Khau-waing-phang*, Kach.; *Ja-mynrei*, Kh.

A rigid evergreen gregarious shrub or small tree, with habits of willows; young parts pubescent. *Bark* dark grey or brown, rough. *Leaves* 3-7 by .5-·8 in., linear-oblong or linear-lanceolate, acute, entire or somewhat glandular toothed towards the apex, glabrescent above, papillose on both surfaces, clothed with scattered and numerous round scales beneath; lateral nerves many, about 10-30 on either half, prominent beneath; base acute or rounded; petiole channelled, .2-·5 in. long; stipules acute, subulate. *Flowers* diœcious, sessile, in axillary bracteate spikes 2-5 in. long;

perianth simple; bracts triangular, acuminate. *Male flowers*-calyx globose; sepals 3 (6?) free, elliptic or suborbicular, valvate; stamens many, in a dense globose cluster of repeatedly branching filaments; anthers red, with sub-globose cell, divaricate; connective obscure. *Female flowers*-sepals 5, usually imbricate, ovate, unequal, acuminate. *Ovary* pubescent, 3-celled; ovule solitary in each cell; style 3, plumose, connate at base. *Capsule* globose, .15 in. across, tomentose, of three 2-valved cocci. *Seeds* yellowish-brown, slightly angular at the inner face; albumen fleshy; cotyledons broad, flat.

LAKHIMPUR, N. E. F. TRACT, SIBSAGAR, KAMRUP, GARO HILLS, N. C. HILLS, GOALPARA, SYLHET and KHASI & JAINTIA HILLS (on rocks or river beds).

Flrs. 3-5. Fr. Rainy season.

47. RICINUS Linn.

Ricinus communis Linn. The Castor Oil Plant. Vern. *Kharanda*. Garo; *Inkiang*, Mik.; *Soh-rasam*. Kh.; *Radan-phang*, Kach.; *Rallungbu*. Kuki; *Era-gach*. Ass.; *Verenda*. Beng.

An evergreen soft-wooded shrub; young parts covered with a glaucous bloom. *Leaves* alternate, 2-9 in. across, palmately lobed, peltate, serrate, membranous; petiole stout, hollow, as long as the leaves. *Flowers* monœcious. *Stamens* numerous. *Ovary* 3-celled; style 3, plumose, 2-fid. *Capsule* globose, echinate, about .5-.9 in. long, splitting into three 2-valved dehiscent cocci. *Seeds* with large caruncle; testa crustaceous.

Cultivated and also apparently wild throughout the Province. The seeds yield the well-known castor oil. The Endi silk worm is reared on the leaves.

Flrs. & Fr. Almost throughout the year.

48. CNESMONE Blume.

Cnesmone javanica Blume. Vern. *Loti-sorot*, Ass.

A large evergreen twining shrub, tomentose with long villous hairs. *Leaves* alternate, 3-5 by 1.5-3 in., ovate-

oblong, acuminate, serrate or dentate, sub-coriaceous, tomentose on both surfaces; lateral nerves 4-6 on either half; base cordate; petiole .5-2 in. long; stipules ovate, persistent. *Flowers* greenish, monœcious, in androgynous pubescent racemes; male flowers uppermost; females lower; perianth simple; bracteoles 2. *Male flowers*-calyx globose; segments 3, valvate; stamens 3, alternating with calyx-segments; filaments free; anthers dorsifixed; cells sub-parallel. *Female flowers* large; sepals 3, velvety. *Ovary* 3-celled, strigose; ovules solitary in each cell; stigmatic lobes 3, connate at base in a fleshy mass, incurved, fimbriate within. *Capsule* 3-dymous, hispid, of three 2-valved cocci. *Seeds* globose, albumen fleshy; cotyledons broad, flat.

UPPER ASSAM, KAMRUP, KHASI HILLS, SYLHET & LUSHAI HILLS.

Flrs. 4. Fr. 8.

***Dalechampia Kurzii* Hk. f.**

A prostrate or scandent shrub, sparsely hairy. *Leaves* deeply 3-lobed, alternate, 2-5 in. long, pubescent beneath, lobes lanceolate, sub-serrate; base cordate; petiole 1 in. long, sparsely hairy. *Flowers* in androgynous involucrate heads; bracts pale green, 2-3-lobed, serrulate; male perianth 4-6, valvate; stamens 20-30; female perianth 8-10, pinnatifid, hirsute. *Ovary* scabrid; style .5 in. long. *Capsule* of 4 globose cocci.

S. LUSHAI HILLS (2,500 ft. Wenger 327).

Flrs. 8. Fr. Cold season.

49. TRAGIA Linn.

***Tragia involucrata* Linn.** Vern. *Bichuti*, Beng.; *Germa-dukha-guphu*, Kach.; *Jong-ma-sai*, Kuki.

A perennial twiner with hispid stinging hairs. *Leaves* alternate, variable, 1-4 by .5-2 in., ovate or oblong, acuminate, serrate, membranous, hispid; lateral nerves 4-5 on either half, slender; base rounded or cordate; petiole .2-1 in. long. *Flowers* monœcious, in terminal and leaf opposed androgynous racemes (male uppermost; female few, below); perianth simple. *Male flowers*-sepals 3-5, valvate; stamens 1-3; anther-cells contiguous, paralld. *Female flowers* sepal 6, imbricate. *Ovary* 3-celled; ovules solitary in each cell; styles free and spreading above. *Capsule* of 3, 2-valved

cocci, .3-.6 in. across, hispid. *Seeds* globose, obscurely hoary; albumen fleshy; cotyledons broad, flat.

N. C. HILLS and KHASI & JAINTIA HILLS (2,500 ft.).

Flrs. 6-8. Fr. 8-10.

50. PTEROCOCCUS Hassk.

Pterococcus corniculatus (Sm.) Pax et Hoffm.

A slender climber, almost glabrous. *Leaves* 2-4 by 1-2 in., ovate-oblong, caudate-acuminate, dentate; lateral nerves 3-4 on either half, arcuate; base cordate; petiole 1-1.5 in. long, biglandular at the apex. *Flowers* in slender androgynous racemes; bracts lanceolate, minute. *Male flowers* minute, fascicled above; perianth segments 4-5, valvate; stamens 8-30 on a conspicuous receptacle; filaments free, short; anthers erect; pistillode obsolete or filiform. *Female flowers* below male flowers; perianth-segments imbricate. *Ovary* 3 or 4-celled; ovules solitary in each cell; style connate in fleshy globose mass. *Capsule* depressed, of 4 stellately spreading granulate cocci, each produced into a linear obtuse wing .2 in. long. *Seeds* pale, keeled, lenticular, mottled all round.

UPPER ASSAM (Jenkins, Griffith).

There is only one sheet of specimens (Malayan) in Sibpur.

Used as a vegetable in Malaya.

Codiaeum variegatum Bl.

An evergreen shrub with brightly coloured curiously shaped variegated leaves; generally known as *Crotons*; cultivated in gardens everywhere.

FAM. 124. ULMACEÆ.

Engl. in Engl. u. Prantl. iii. 1.59. (Urticaceæ, tribes 1. Ulmeæ, II. Celtideæ. Gen. Pl. III 343).

Trees or shrubs, sap watery. *Leaves* alternate, simple, bifarious, often unequal-sided; stipules often caducous. *Flowers* unisexual or polygamous, in axillary clusters or cymes; females sometimes solitary. *Perianth* usually 4-5 lobed, free or united, sepaloïd. *Stamens* 4-5, opposite the perianth lobes, in 2 whorls. *Ovary* (rudimentary in male flowers) of 2 carpels, usually 1-celled (sometimes 2-celled); ovule 1, pendulous, anatropous or amphitropous; style 2, 2-fid, divergent, stigmatose on their inner faces. *Fruit* indehiscent, a nut, samara or drupe. *Seed* exalbuminous; embryo straight or curved; cotyledons folded or flat, (cystolith cells often visible on the epidermis). No laticiferous tubes.

Fruit a samara :—

Leaves serrate; lateral nerves many,
straight :—

Cotyledons flat. 1. **Ulmus.**

Leaves entire; lateral nerves few, arcuate :—

Cotyledons folded. 2. **Holoptelea.**

Fruit a drupe :—

Male sepals imbricate :—

Leaves 3-nerved; stipules free. .. 3. **Celtis.**

Leaves penni-nerved. Pistillode woolly.

Stipules connate. 4. **Gironniera.**

Male sepals induplicate-valvate :—

Leaves scabrid; base 3-7-nerved; pistillode
glabrous. 5. **Trema.**

1. ULMUS Linn.

Ulmus lancifolia Roxb. Vern. *Bor-sui*, *Selsue*, Garo, *Rei-ha-thing*, Kuki; *Dieng-tyrsan*, Khasi; *Manuk*, Ass.

A large deciduous tree (100'/100"). *Bark* greyish-brown, .3 in. thick, rough, somewhat corky, exfoliating in flakes: inside reddish, dark, hard but with the finer fibres, turning

yellowish brown; young parts hairy. *Leaves* 1·4·5 by ·5-1·7 in., lanceolate, elliptic-lanceolate, bluntly acuminate. finely serrate or crenate, thinly coriaceous, glabrous; nerves elegantly reticulated; base unequal; petiole ·05-·16 in. long. *Pedicels* articulate. *Perianth* campanulate, 5-cleft. *Samara* about 1 in. long, stipitate, oblique, obovate or sub-orbicular. membranous.

GARO HILLS, KAMRUP, NOWGONG, LUSHAI HILLS, SIB-SAGAR and K. & J. HILLS. (upto 5,000 ft.).

Wood cream coloured. Leaves are cattle fodder. •

Flrs. Cold season. Fr. 3-5.

2. HOLOPTELEA Planch.

Holoptelea integrifolia Planch. Vern. *Laphang*. Jharua.

A large deciduous tree (60'/108"). *Bark* dark-grey, with deep longitudinal cracks on old trees, fairly smooth on young stems; inside light brown, with concentric bands or greenish-brown or irregularly mottled with brown strands; with characteristic smell; branches lenticellate; young shoots pubescent. *Leaves* 2·5·5 by 1·2-2·5 in., elliptic-ovate or oblong, acuminate, entire. coriaceous, glabrous. glabrescent or pubescent beneath when young, minutely rugose with raised dots; lateral nerves 5-8 on either half. arcuate; base rounded or sub-cordate; petiole ·3-·6 in. long; stipules ·2-·3 in., scarious. *Flowers* green; male or bisexual in pubescent fascicles or short racemes from the leaf scars of previous year's shoots and appearing before the leaves: pedicels short, elongating in fruit. *Perianth* campanulate, 4-8-cleft. *Stamens* 8, in 2-whorls. *Ovary* stipitate. *Samara* ·75-1·2 in. long, ovate or suborbicular, notched, abruptly narrowed into a stipe.

GOALPARA & GARO HILLS.

Wood yellowish-grey, moderately hard; pores small and uniformly distributed. Weight 40 lbs. per c. ft. Wood is used for carving, etc., used in building aeroplanes during the last war.

Flrs. 2-4. Fr. 5-8.

3. *CELTIS* Linn.

Trees or shrubs. *Leaves* palmately 3-nerved, alternate, bifarious, entire or serrate. *Flowers* small, polygamous, solitary or cymose; male and bisexual cymes usually at the base of the shoots; female in the upper axils. *Sepal* 4-6, imbricate. *Stamens* isomerous. *Ovary* sessile on a woolly disc; style plumose. *Fruit* a small drupe, ovoid or globose; albumen 0 or scanty; embryo curved; cotyledons broad, oily, surrounding the upcurved radicle.

Drupe solitary or binate :—

Secondary nerves usually 3 on either half as strong as the basal :—

Leaves serrate or sub-entire. Sepals 4-5 :—

Drupe ellipsoid or ovoid. .. 1. *C. australis*.

Secondary nerves 1-3 (usually 2-3) on either half, as strong as the basal :—

Leaves more entire. Sepals 4 :—

Drupe sub-globose or broadly ovoid. .. 2. *C. tetrandra*.

Drupe seriate :—

Secondary nerves very much weaker than the basal nerves :—

Sepals 5 :—

Drupe narrowed at both ends. .. 3. *C. cinnamomea*.

1. *Celtis australis* Linn. Vern. *Dieng-soh-thang-chi*, Khasi; *Theng-pi-bichurang-arong*, Mik.; *Mohita*, Ass.; *Bonridn*, Kach.; *Thing-sakngar*, Kuki.

A middle-sized deciduous tree; branchlets drooping. *Bark* bluish or greenish grey, smooth, with small horizontal wrinkles; inside white, mottled with brown. *Leaves* alternate, 1·5-5 by ·8-2 in., ovate or ovate-lanceolate or ovate-elliptic, acuminate, serrate or entire towards the base, coriaceous, dark green and glabrous above, often scabrid, more or less pubescent beneath; basal nerves 3; secondary nerves usually 2-3 on either half, as strong as the basal; base oblique, rounded or obtuse; petiole ·1·3 in. long; stipules ·3 in. long, subulate, caducous. *Sepals* 4-5. *Ovary* sessile. *Drupe* ovoid or ellipsoid, ·3 in. long, more or less rugose, woolly at the base; peduncles ·5-2 in. long.

N. E. F. TRACT, LAKHIMPUR, N. C. HILLS and K. & J. HILLS.

Wood is tough and strong; is used for oars and other purposes. Weight 47 lbs. per c. ft. The leaves are cattle fodder.

Flrs. 3-5. Fr. 6-10.

C. australis Linn. Var. *eriocarpa* DC. Vern. *Bonridin*, Kach.; *Kongnal*, Kuki.

A large tree (120'/180'') buttressed at base. *Bark* dark greyish-brown outside, rough with vertical close ridges, .3 in thick; inside light dark-brown, hard, fibrous in very thin layers, not mottled at all but variegated with streaks of softer tissue. *Leaves* 2.3-5 by .8-1.5 in., ovate or ovate-lanceolate, acuminate, crenate-serrate from near the base, sub-coriaceous, scaberulous above, softly tomentose beneath; lateral nerves 4-6 on either half as strong as the basal. *Stigma* sessile, 2-fid; arms recurved, brown, shaggy. *Drupe* solitary, white pubescent or woolly, supported by 5 pubescent strap-shaped perianth lobes; putamen brown, rugose.

N. C. HILLS.

Flrs. 3-4. Fr. 5.

2. Celtis tetrandra Roxb. Vern. *Bura*, Cach.; *Phatong*, Mech; *Bol-kerasru*, *Bol-chhek*, Garo; *Huktaptia*, *Noni-bhola*, *Mouhita*, *Hukotia*, *Mirihukuta*, Ass.; *Theng-pi-bithi-lorn-arong*, Mik.; *Dieng-chini*, Khasi; *Dieng-ja-lipiar*, *Dieng-intiar*, Synt.; *Tamagasing*, Miri; *Pomid-asing*, Abor.

A large handsome deciduous tree (100'/144''); young parts pubescent. *Bark* dark-grey, lenticellate, horizontally wrinkled, .3-.5 in. thick, yellowish-white; inside mottled with strands of dark-brown tissues. *Leaves* alternate, 1.5-6 by 8-2.5 in., elliptic, ovate or ovate-lanceolate, acuminate, often caudate, serrate above the middle or sub-entire, coriaceous, glabrescent with tufts of hairs on nerve axils beneath; main lateral nerves 1-3 on either half, converging towards the apex, almost as strong as the basal pairs; tertiaries strong, scalariform; base oblique, rounded or acute; petiole .05-.5 in. long, channelled; stipules .2 in. long, linear-lanceolate, cauducous. *Male flowers*—pedicels 1 in. long. *Bisexual flowers*—pedicels .3 in. long. *Sepals* usually 4. *Ovary* sessile, pilose towards the apex. *Drupe* sub-globose or broadly ovoid, .25-.3 by .2 in., orange-red when ripe; peduncle .4-.7 in. long in fruit.

Common throughout the Province, ascending upto 3,000 ft.

Flrs. 2-3. Fr. 10-11.

Var. Hamiltonii.—Branchlets and leaves pubescent, drying yellowish-green (KHASI HILLS).

3. *Celtis cinnamomea* Lindl.

A middle sized tree. *Bark* grey, rough and warty, with horizontal bands of lenticels, $\cdot 16\text{--}\cdot 2$ in. thick; inside pale yellow, mottled, dark-brown or black. *Leaves* alternate, bifarious, $2\text{--}4\cdot 5$ by $1\cdot 2\text{--}1\cdot 8$ in., ovate, ovate-lanceolate, caudate-acuminate, entire or shallowly serrate towards the apex, rather membranous, glabrous, 3-nerved at base; basal nerves converging towards and almost reaching the apex; secondary nerves much weaker than the basal; tertiaries and veins obscure; base oblique, rounded or obtuse; petiole $\cdot 2\text{--}\cdot 5$ in. long; stipules $\cdot 3$ in. long. *Sepals* usually 5. *Drupe* 2 or several on the peduncles ($\cdot 7\text{--}\cdot 9$ in. long), ellipsoid, narrowed towards both ends, $\cdot 3$ by $\cdot 2$ in.; putamen hard, white, rugose.

GARO HILLS, SYLHET and K. & J. HILLS.

Flrs. 1. Fr. 4-7.

C. sinensis Pers.

A large deciduous tree; bark grey, smooth, thin; crown spreading. *Leaves* ovate, ovate-oblong, acuminate, sparsely dentate or entire, glabrescent; base acute, somewhat unequal. *Flowers* hermaphrodite, axillary, solitary. *Drupe* minutely ellipsoid or sub-globose, orange coloured.

Delai Valley. (Kingdon Ward 8007) 2,000 ft.

Fr. 4.

4. *GIRONNIERA* Gaud.

Evergreen trees or shrubs. *Leaves* alternate, penninerved, coriaceous; caducous; nerves impressed above, very prominent beneath; stipules sheathing. *Male flowers*—sepals 5, broad, obtuse, imbricate; stamens 5, erect in bud; pistillode woolly. *Female flower*—sepals narrower, acute; ovary sessile; style central; arms 2, filiform; ovule pendulous. *Drupe* ovoid, usually 2-keeled; endocarp hard; embryo contorted; albumen 0, scanty or copious.

Gironniera reticulata Thw. Vern. *Dieng-charkhei*. Khasi.

A large evergreen tree (86'/96'') buttressed at base; branchlets lenticellate. *Bark* cinnamon brown, .3 in. thick, exfoliating in loose irregular overhanging flakes; inside light rosy-pink, with very fine wavy streaks of lighter coloured tissues, turning reddish-brown, very finely fibrous, in thin papery layers (light red underneath the corky layer). *Leaves* 2.5-7 by .8-.5 in., ovate, ovate-oblong or ovate-lanceolate, acuminate, entire, coriaceous, glabrous; lateral nerves 6-14 on either half; veins elegantly reticulated; base rounded or acute; petiole .2-.6 in. long. *Male flowers* in short axillary paniced cymes; stamens inflexed in bud; pistillode a very minute tuft of hairs. *Ovary* glabrous. *Drupe* ovoid, glabrous, .5-.7 in. long, beaked, crowned by the feathery stigma.

N. E. F. TRACT.—Pasighat, CACHAR, N. C. HILLS, SYLHET and K. & J. HILLS (upto 4,000 ft.).

Wood reddish or brown, compact, fine grained (somewhat like *Artocarpus*), hard, smooth, takes a fine polish; pores medium-sized; medullary rays very fine and numerous. A heavy strong timber very little known in the market, but is worth considerable attention.

Flrs. 5-6. Fr. Cold season.

G. Thomsoni King in Herb Kew.

A large tree. *Leaves* alternate, 4-6 by 2-3 in., ovate-oblong, entire, acuminate, coriaceous, glabrous; base rounded; lateral nerves 10-12 on either half, arcuate, prominent beneath; midrib impressed above; petiole .4-.6 in. long. *Flowers* (male) usually in axillary cymes; sepals oblong, obtuse, glabrous.

ASSAM upto 4,000 ft.

Flrs. 4-5. Fr. Later upto 10.

5. TREMA Lour.

Shrubs or trees. *Leaves* alternate, serrate; base often oblique; basal nerves 3-7; stipules lateral, caducous. *Flowers* small, green, diœcious, 1-sexual or polygamous, in axillary cymes. *Sepals* 4-5, usually induplicately valvate. *Stamens* 4-5. *Pistillode* small, glabrous. *Ovary* sessile; style 2-fid or stigma 2. *Drupe* small, supported by the persistent perianth;

albumen fleshy; embryo curved; cotyledons narrow; radicle up-curved, incumbent.

Basal nerves mostly 3; base oblique :—

Leaves silky beneath :—

Branchlets adpressed-pubescent :—

Cymes lax. 1. *T. orientalis*.

Branchlets villous or tomentose :—

Cymes dense. 2. *T. amboinensis*.

Basal nerves mostly 5; base more or less equal-sided :—

Leaves scabrid on both surfaces :—

Branchlets scabridly hairy. 3. *T. politoria*.

1. *Trema orientalis* Bl. Vern. *Phakram*, Garo; *Phak-dima*, (Sadiya) *Jopang*, *Jhupon*, *Sobaigoch*, Ass.; *Gunali*, Sylh.; *Belphur*, Lushai; *Hattou*, Kuki; *Phadam*, Mech; *Rampak-arong*, Mik.; *Phaslang*, *Tum-lisha-phang*, Kach.; *Dieng-lang-ta*, Kh. *Kunhel*, Nep.; *Alo*, *Lalong*, *Dalaw-asing*, Miri; *Alo-asing*, Abor; *Sabai-gos*, Lakhimpur; *Machmai*, Darrang; *Yalu-changne*, Daff.; *Dieng-lattar*, Synt.; *Jinggini*, Kach.; *Tithu* (*Taroan*), *Atom* (*Midu*) Mishmi.

A small fast-growing and short-lived tree; branches and branchlets somewhat ascending; twigs adpressed pubescent. *Bark* thin, greenish-grey or bluish-green, smooth, with numerous reddish lenticels; blaze yellowish green. *Leaves* drooping, 2-6 by 1-3 in., ovate, ovate-lanceolate or ovate-oblong, caudate-acuminate, crenulate or serrulate, rather membranous, scabrid above, more or less grey or white pubescent or tomentose beneath; base oblique, subcordate or cordate; basal nerves 3-7 (principally 3); lateral nerves 3-4 on either half; petiole .2-.4 in. long. *Male cymes* dense, sometimes lax; *female cymes* lax; sepals flat. *Stigma* papillose. *Drupe* .15-.17 in. long.

Common throughout the province.

Wood light reddish, 28 lbs. per c. ft.

The bark is used by Garos for making a coarse mattress. The bark yields a strong fibre. The leaves are lopped for cattle fodder.

Flrs. 2-4. Fr. 6-8.

2. *Trema amboinensis* Bl. Vern. Phadam-jola, Mech.

A tree (80'/90'') nearly allied to *T. orientalis*; branchlets villous or tomentose, with spreading hairs. *Bark* whitish, rough, with warts and both fine and large horizontal wrinkles, about .3 in. thick; inside finely fibrous, red with fine as well as distant broad streaks of lighter coloured tissues. *Leaves* shining, large, 3-6 by 1.5-2.7 in., ovate-oblong, caudate-acuminate, scaberulous above, pubescent or tomentose with spreading hairs & white beneath. *Male cymes* dense; style feathery.

N. C. HILLS, SIBSAGAR, GOALPARA, KAMRUP, SYLHET, DARRANG and K. & J. HILLS.

Flrs. 4-7. Fr. 9-11.

3. *Trema politoria* Planch.

A fast growing shrub or small tree. *Bark* pale-brown, smooth, dotted with lenticels; branchlets scabrid. *Leaves* 2.5 by .5-2 in., oblong, ovate-oblong or ovate-lanceolate, acute or acuminate, crenate, serrulate, membranous, scabrid and thinly hispid on both surfaces; base rounded, truncate or subcordate; petiole .2-.4 in. long, channelled; stipules .3-.4 in. long. *Cymes* usually not exceeding petioles. *Drupe* .1-.15 in. in diameter, ellipsoid or globose, black when ripe.

GOALPARA & KAMRUP. Comes up freely on land slips.

The bark yields a strong fibre. The leaves are cattle fodder and also used like sand paper for polishing wood etc.

Flrs. 4-6. Fr. 10-11.

FAM. 125. MORACEÆ.

(Engl. in Engl. u. Prantl III 1. 66. Urticaceæ, tribes IV, Moreæ V. Artocarpeæ VI. Conocephaleæ, Gtn. Pl. III. 344).

Trees, shrubs or herbs, often with milky latex. *Leaves* usually alternate, rarely opposite, simple, rarely lobed, frequently dotted (cystoliths); stipules deciduous, large, often amplexicaul, leaving an annular scar. *Flowers* small, monœcious or diœcious, usually cymose, sometimes becoming capitate, (spiciform in some genera) crowded on the inside or outside of fleshy receptacle; female sometimes solitary. *Male and female inflorescences* sometimes different. *Perianth* single, calycine, usually 4-merous, free or connate, often accrescent in fruit. *Stamens* isomerous and opposite the sepals or reduced in number, inflexed or erect in bud; anthers dehiscing (rarely erect or basal). *Fruit* an achene, a drupe or sub 2-valvular, often aggregated into fleshy pseudocarps or anthocarps. *Seeds* albuminous or not; embryo usually curved; cotyledons often unequal, the larger folding round the other.

Fruit a syncarp :—

Stamens erect :—

Flowers unisexual, minute, on the inner wall of a closed hollow receptacle which is fleshy in fruit.

1. Ficus.

Flowers in naked or bracteate heads, rarely racemes :—

Flowers in globose or (male) cylindric heads :—

Stamens 1. **2. Artocarpus.**

Stamens 4. **3. Cudrania.**

Flowers male in cylindric spikes, female in racemes.

4. Balanostreblus.

Male and female heads cymose, or female solitary :—

Stamens free; style short :—

Fruit syncarpous. **5. Conocephalus.**

Stamens inflexed in bud :—

Male and female flowers spicate or female subcapitate :—

Ripe carpels enclosed in the syncarp. **6. Morus.**

Male flowers spicate :—

Ripe carpels pendulous on long fleshy stalks :—

Achenes stipitate. .. **7. Broussonetia.**

Male flowers in fascicled spikes, female in globose heads :—

Achenes sessile. .. **8. Allæanthus.**

Fruit the result of one flower :—

Unarmed :—

Glabrous. Leaves quite entire :—

Males in short cymes; female solitary :—

Sepal accrescent, enclosing the fruit. **9. Pseudostreblus.**

Hairy. Leaves irregularly dentate :—

Male subcapitate; female solitary :—

Sepals closely imbricating. .. **10. Streblus.**

More or less armed :—

Male flowers spicate; females solitary or

few on a peduncle, not laticiferous. .. **11. Taxotrophis.**

1. FICUS Linn.

Trees or shrubs of very variable habit, often epiphytic, sometimes creeping or climbing by adventitious roots, with milky juice. *Leaves* usually alternate (rarely opposite), entire, lobed, serrate or toothed; stipules often enclosing the bud, deciduous, leaving annular scars. *Inflorescence* is hollowed out and consists of a number of flowers often mixed with a few bracteoles inside a pear-shaped or globose common receptacle which opens by a narrow mouth at the top; receptacles usually with 3-4 bracteoles at the base, often lengthening into a stalk and the mouth closed by imbricate bracts, axillary or on tubercles from the main stem and large branches or on special leafless shoots arising from the main stem from near its base. *Flowers* minute, 1-sexual, monœcious or rarely diœcious. *Male flowers* :—perianth 2-6-fid, or partite; stamens 1 or 2 (rarely 3-6), erect in bud. *Pseudo-hermaphrodite flowers* :—perianth as in male with pistil which does not produce seeds. *Female flowers* :—perianth as in male

or imperfect; ovules pendulous; style excentric; stigma entire or 2-armed. *Gall flowers* :—perianth as in female flowers; ovary contains the pupa of a hymenopterous insect; style short. *Neuter flowers* :—perianth as in male. *Fruit* an enlarged hollow receptacle, the inner wall of which is crowded with crustaceous or fleshy achenes; embryo curved; albumen scanty; radicle ascending.

Mode of pollination is extraordinary, there being a special insect (*Blastophaga-wasp*), adapted to *Ficus* flowers. The gravid female enters a fig inflorescence and lays eggs in the gall flowers and as the perfect insects emerge they carry the pollen to other receptacles and thus fertilize the female flowers.

Narrow connective bands of parenchyma in the wood. (Brandis).

A. Pseudo-hermaphrodite :—

1. Male flowers monandrous with a rudimentary pistil in the same receptacle, with gall flowers and female flowers in separate receptacles. 1. Palæomorphe.

B. Unisexual or asexual :—

Male flowers without rudimentary pistil :—

2. Male, gall and fertile female flowers on the same receptacle. 2. Urostigma.
3. Male flowers unisexual and gall flowers in one set of receptacles; fertile female flowers only in another set :—

(a) Flowers monandrous :—

- (i) Receptacle mostly axillary. .. 3. Sycidium.
- (ii) Receptacle mainly in fascicles from stem or branches. 4. Covellia.

(b) Flowers diandrous :—

- (i) Receptacle mostly axillary. .. 5. Eusyce.
- (ii) Receptacle mostly in fascicles from stem or branches. .. 6. Neomorphe.

Section Synæcia is not represented in Assam.

(After King P., XI Annal. R. B. Garden, Calcutta. Vol. I).

Section 1. Palæomorphe :—

Stipules long, ovate-lanceolate, acuminate :—

Leaves inequilateral, lanceolate or elliptic-ovate, acuminate, entire :—

- Female sepals 4, hyaline. 1. *F. gibbosa*.

Stipules minute :—

Leaves broader, ovate or ovate-elliptic,
abruptly caudate :—

Female perianth 3-cleft. 2. *F. urophylla*.

Section II. Urostigma :—

Leaves coriaceous, pubescent when young,
more or less ovate; base more or less cor-
date :—

Receptacle globose, pubescent :—

Leaves thickly chartaceous; lateral nerves
4-7 on either half. 3. *F. bengalensis*.

Receptacle oblong or ovoid, tomentose :—

Leaves coriaceous; lateral nerves 12-20
on either half. 4. *F. mysorensis*.

Leaves coriaceous, glabrous at all times, more
or less ovate or elliptic; base not cordate :—

Receptacle oblong :—

Leaves broadly elliptic or ovate-oblong,
shortly cuspidate. 5. *F. altissima*.

Leaves coriaceous, narrowly elliptic or
oblanceolate, all parts glabrous; base 3-
nerved, cuneate; lateral nerves 10-12 on either
half. 6. *F. obtusifolia*.

Leaves coriaceous or sub-coriaceous; lateral
nerves fine, numerous, nearly at right angle
to the midrib, anastomising little except at
the margin :—

Stipule large, sub-persistent :—

Receptacles, greenish-yellow when ripe. 7. *F. elastica*.

Stipules small, caducous :—

Receptacle yellow or red when ripe. .. 8. *F. Benjamina*.

Leaves sub-coriaceous; nerves conspicuous;
nervules and reticulation minute but dis-
tinct :—

Receptacle .5 in. across or more :—

Stipules small :—

Leaves narrow-elliptic, oblong. .. 9. *F. rhododendrifolia*

Receptacle less than .5 in. across :—

All parts glabrous, receptacle bluish-
purple. 10. *F. glabella*.

Young parts pubescent or glabrous;
receptacle yellowish or reddish. .. 11. *F. retusa*.

Leaves coriaceous, elliptic or oblanceolate :—

Receptacle with a distinct slender pedun-
cle with 3-free bracts low down on the
peduncle; stipules pubescent. .. 12. *F. nervosa*.

Leaves sub-coriaceous or membranous, on long slender petioles which are sometimes jointed to the blade :—

Leaves cordate, acuminate :—

Acumen short :—

Base truncate. 13. *F. Rumphii.*

Acumen long :—

Base rounded or truncate, rarely cordate. 14. *F. religiosa.*

Leaves not cordate, acuminate :—

Receptacle glabrous, sessile :—

Leaves almost membranous :—

Male perianth 4-5-partite; petiole 1·5-2 in. long. 15. *F. infectoria.*

Leaves sub-coriaceous :—

Receptacle shortly pedunculate :—

Male perianth gamophyllous; petiole 2·5-4 in. long. 16. *F. geniculata.*

III. Sycidium :—

Erect shrubs or trees :—

Leaves entire or nearly so, caudate-acuminate :—

Receptacles clavate or sub-globose, ·3 in. across or more. 17. *F. clavata.*

Receptacle in axillary pairs; achene triangular :—

Female perianth similar to male perianth; leaf base 3-nerved. 19. *F. bhotanica.*

Receptacle in axillary pairs; achene orbicular or ovoid :—

Leaves very inequilateral, base 3-5-nerved. 20. *F. obscura.*

Creeping, straggling or scandent shrub :—

Receptacle ·5 in. across or more; base rounded, truncate or cordate, 3-5-nerved. 21. *F. heterophylla.*

Receptacle about ·25 in. across; base cuneate, 3-nerved. 22. *F. rostrata.*

IV. Covellia :—

Leaves mostly opposite :—

Receptacle axillary, sub-globose :—

Leaves narrow, linear, oblanceolate or cuneate; base-narrowed into the petiole; young parts mostly hirsute. 23. *F. sœmocarpa.*

Receptacle axillary or on tubercle on the same plant :—

Leaves ovate-oblong or elliptic-oblong; base sub-cordate or rounded; all parts hispid. 24. *F. hispida.*

Leaves mostly alternate :—

Receptacles shortly hispid and verrucose when ripe, .4-.7 in. across, reddish-brown (ripe) :—

Leaves unequally sub-auriculate; tomentose when young; base cordate. .. 25. *F. Cunia*.

Receptacles sub-pyriform and verrucose, .5 in. across :—

Leaves glabrous, shining, tapering to the base. .. 26. *F. prostrata*.

Receptacles dimorphic, .6-1 in. across, depressed, globose, glabrous :—

Leaves granulate beneath. .. 27. *F. fistulosa*.

V. Eusyce :—

Erect shrubs or trees :—

Young parts densely tomentose :—

Leaves not entire (dentate or lobed) :—

Receptacle hispid-tomentose. .. 28. *F. hirta*.

Young parts sparsely hairy :—

Leaves entire or nearly so :—

Receptacle pedunculate lengthening out into a stalk :—

Gradually constricted. .. 29. *F. pyriformis*.

Suddenly constricted. .. 30. *F. erecta*.

Receptacle ovoid, sub-sessile. .. 31. *F. silhetensis*.

Young shoots silky with long hairs; stipule amplexicaul :—

Receptacle orange-red. .. 32. *F. lepidosa*.

Young parts glabrous :—

Leaves entire :—

All kinds of flowers in the same receptacle; male flowers 2-3. .. 33. *F. nemoralis*.

Creeping or epiphytic :—

Leaves ovate, rotund, pubescent or puberulous, membranous :—

Receptacle long pedunculate. .. 34. *F. lævis*.

Leaves broadly ovate, glabrous when mature, entire, chartaceous. .. 35. *F. scandens*.

Leaves oblong, length twice the breadth :—

Leaves glabrous or nearly so when adult :—

Receptacle with basal bracteoles solitary, globose or ovoid, hairy, .3-.8 in. across. .. 36. *F. foveolata*.

Receptacle solitary or clustered, glabrous, orange-red when ripe, .2-.5 in. across. .. 37. *F. ramentacea*.

Leaves hairy beneath :—

Receptacles solitary or in pairs, almost glabrous, globose, .3-.4 in. across. .. 38. *F. crininervia*.

VI. Neomorphe :—

Erect trees :—

Leaves broadly ovate, serrate or denticulate;
base deeply cordate :—Receptacle tuberculed, 2 in. across. .. 39. *F. Roxburghii*.Leaves ovate-elliptic, serrate, sub-coriaceous;
base not cordate :—Receptacle 1 in. across. .. 40. *F. pomifera*.Leaves entire; ovate, ovate-oblong; base acute
or obtuse :—

Receptacle pedunculate, 1·25 in. across.

Leaves membranous. .. 41. *F. glomerata*.

Leaves entire, lanceolate :—

Receptacle turbinate when ripe, depressed,
verrucose, 1·2 in. across in cluster of 5-8. 42. *F. lanceolata*.Leaves entire, oblong or narrowed, elliptic,
inequilateral :—Receptacles smooth, in bracteate panicles,
about 1 in. across. .. 43. *F. Clarkei*.

1. *Ficus gibbosa* Bl. Vern. *Loti-dicoru*, Jaribur, Ass.;
Dieng-soh-la-khain, Khasi; *Ratke*, Miri & Abor; *Jamman*,
Kuki; *Phrap-rakhet*, Garo.

A small or sometimes a large tree, often epiphytic; young branches scaberulous. *Bark* darkish-grey, warty; blaze greenish. *Leaves* 2·5-6 by 1·3-2·5 in., usually inequilateral, ovate-elliptic or elliptic-lanceolate, sometimes gibbous towards the base, entire, usually more or less acuminate, thinly coriaceous, glabrous above, harsh and brownish beneath (when dry); lateral nerves 3-6 on either half conspicuous, with intra-marginal veins, never lucid; base 3-nerved, cuneate or obtuse; petiole ·3-·6 in. long; stipules convolute. *Receptacles* yellowish when ripe, ·25-·3 in. across, pedunculate, globose or pyriform, minutely hairy and verrucose, rather scabrid with few basal bracts below the peduncle situated in the receptacle containing gall flowers. *Male* flowers; perianth segments 4-6, linear, fleshy; anther 1 with a short filament. *Fertile female* flowers in separate receptacle; perianth hyaline, with linear hairy segments. *Ovary* globose, smooth; style short, lateral. *Achene* obliquely ovoid, slightly hairy.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, NOWGONG, KAMRUP, N. C. HILLS, LUSHAI HILLS, CACHAR, GOALPARA, GARO HILLS and K. & J. HILLS.

Flrs. 1-3.

Var. typica—Leaves variable, lobed purplish-brown beneath, nerves and veins pale.

Common throughout the Province.

Var. cuspidifera—Vern *Ratke-asing*, Miri; *Mumugichak*, Naga. Leaves elongate, more or less acuminate, minutely tubercled beneath, opaque.

N. E. F. TRACT, SIBSAGAR.

F. subulata Bl.

A large straggling diœcious shrub; young parts minutely pubescent. Leaves 4-10 in., elliptic, elliptic-lanceolate, or oblanceolate, entire, membranous, hispid; lateral nerves 10-20 on either half; petiole about .3 in. long; stipules .5-1 in., subulate. *Male and gall flowers* in ovoid receptacles and female in globose receptacles (without male flowers). *Perianth* gamophyllous, hairy; lobes 4, oblong. *Receptacle* orange-red, with no basal bracts.

LUSHAI HILLS.

Flrs. & Fr. Cold season to hot season.

2. Ficus urophylla Wall.

An erect shrub or small tree (40-50 ft. high), often epiphytic; young parts sub-scabrid. Leaves 2-4 by 1.2-2.4 in., elliptic or ovate, entire, abruptly caudate, entire or undulate, coriaceous, glabrous; lateral nerves 2-4 on either half, more prominent beneath; base narrowed into the petiole which is .2-.3 in. long; stipules minute, subulate. *Receptacle* shortly pedunculate, axillary, subglobose, scabrid, hispid, .2-.3 in. across, reddish yellow when ripe; basal bracts absent; peduncles hirsute. *Male flowers* sepals 4; stamen 1, joined to a pistillode. *Female flowers* perianth 3-fid; style short, diverging. *Achene* obliquely ovoid.

KAMRUP, K. & J. HILLS.

Flrs. 2-3. Ripe fruit rainy season.

3. *Ficus bengalensis* Linn. The Banyan tree. Vern. *Rabung*, Kuki; *Khong-nang*, Manip.; *Gonok*, Garo; *Bor*, Ass.; *Vata*, Sans.

A spreading evergreen tree, epiphytic in early life, sending down ærial roots from the branches which thicken greatly and ultimately become stilts. *Bark* smooth, greyish; young parts softly pubescent. *Leaves* 4-8 by 2-5 in., ovate-elliptic, entire, obtuse or rounded, coriaceous, green and glossy above, glabrescent or pubescent beneath; lateral nerves 4-7 on either half, looped within the margin, prominent beneath; base 3-7 nerved (upper pair stout), usually rounded or sub-cordate; petiole .5-2 in. long; stipules .7-1 in. long, deltoid, acute, coriaceous. *Male gall and fertile (female) flowers* in the same receptacle. *Male flowers* numerous near the mouth of the receptacle; perianth segments 4; stamen 1. *Gall flowers* similar, with a short style. *Female flowers* with smaller perianth and elongated style. *Receptacle* .5-.75 in. across, globose, pubescent, sessile, axillary, supported by 3 rounded coriaceous spreading bracts, scarlet when ripe.

Common as a shade tree.

SYLHET, CACHAR, KAMRUP & GARO HILLS (upto 4,000 ft.).

Wood is used as a well-curb, durable in water. The bark is tonic and diuretic; milky juice is made into bird-lime. Leaves and twigs are fodder for cattle and elephants.

Ripe fruit. 4-7.

4. *Ficus mysorensis* Heyne. Vern. *Dhopobar*, Ass.; *Phrap*, Garo; *Laidap*, Kach.; *Rabung-tak*, Kuki; *Dibuk-changne*, Duff.; *Dieng-ka-jiri*; *Rotga-asing*, Miri.

A very large tree, epiphytic in early life, 12'-15' in girth; young parts tomentose. *Bark* greyish, fairly plain, with horizontal wrinkles; inside light brown or darkish cream, mottled and brittle. *Leaves* 6-10 by 2-5-5-5 in., broadly elliptic or ovate-elliptic, entire, bluntly acuminate, coriaceous, glabrous and dotted (numerous) above, glabrescent beneath; lateral nerves 12-20 on either half, anastomising into an intra-marginal nerve; tertiaries very finely and elegantly reticulate; base 3-8 nerved rounded or shallow cordate; petiole .8-1-5 in. long; stipules broadly triangular, rusty-tomentose. *Male*

flowers crowded near the apex of the receptacle, pedicellate; perianth segments 4; stamen 1. *Female flowers*-style lateral, elongated. *Receptacle* globose, generally in pairs, bright orange when ripe, 1-1.5 in. across, glabrous, rusty-tomentose when young, with three tubercled broad spreading basal bracts. *Achenes* ovoid.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, DARRANG, NOWGONG, KAMRUP, GOALPARA, GARO HILLS and K. & J. HILLS (upto 3,000 ft.).

Flrs. Cold season. Ripe fruit 4-8.

5. *Ficus altissima* Bl. Vern. *Gadgubar*, Ass.; *Dhop*, Mech.

An enormous spreading tree, with ærial roots (15'-20' in girth). *Bark* greyish, rough; inside whitish with brown dots. *Leaves* 4-7 by 2-4 in., broadly elliptic or ovate-elliptic or ovate-lanceolate, rather obtuse, entire, coriaceous, glabrous and dotted above, glabrescent beneath; lateral nerves 5-7 on either half (sometimes more); base usually 3-nerved and rounded; petiole .7-1.8 in. long; stipules about 2 in. long, lanceolate. *Male flowers* scattered; perianth segments 4; anther subsessile. *Fertile female flowers* usually sessile; style elongated. *Ovary* minutely tubercled. *Receptacles* sessile in axillary pairs, enclosed in deciduous bracteate calyptra, yellowish when ripe, ovoid, .75-1.2 in. across.

N. E. F. TRACT, KAMRUP & GOALPARA.

Decoction of bark with lime gives light red dye (Mangaldai).

Flrs. Cold season. Ripe fruit hot season.

F. *glaberrima* Bl. Vern. *Dieng-tharlat*, Khasi; *Nah-o'ai*, Kuki; *pane-asing*, Abor.

A large tree (80'/74'') glabrous, epiphytic in early life, usually buttressed. *Bark* darkish-grey, with large warts, hard, .3 in. thick; inside brown, with light pinkish streaks. *Leaves* 5-8 by 1.25-2.25 in., oblong-lanceolate, ovate-lanceolate or elliptic, entire, acuminate, subcoriaceous, glabrous, shining above and dotted beneath; lateral nerves about 10 on either half, impressed above, prominent beneath; basal nerves 3; petiole 1-2 in. long; stipules about .7 in. long, glabrous, fugacious. *Male flowers* few, sub-sessile; perianth segments 4; stamen 1; filament short. *Call flowers* usually sessile; perianth 4-fid.

Fertile female flowers—perianth obsolete. *Receptacles* axillary, 1 or 2 together, sub-pyriform, tubercled, about .25 in. across, orange-coloured when ripe, pedunculate; peduncle .3-.6 in. long; basal bracts 3, deciduous, pubescent. *Achenes* viscid.

N. E. F. TRACT, CACHAR, K. & J. HILLS (5,000 ft.).

Fr. Cold season.

6. *Ficus obtusifolia* Roxb. Vern. *Kathal-patia-bor*, *Kothalua-jari*, Ass.; *Dieng-surisoh*, Khasi; *Hnalhul*, Lushai; *Lewa*, *Phakri*, Mech; *Swet-bot*, Sylh.

A large tree, glabrous, often epiphytic. *Bark* greyish, thin, rough; blaze light-red, exuding sticky milky juice. *Leaves* 2.5-7.5 by 1.3-.5 in., oblong-elliptic or obovate-elliptic, entire, obtuse or rounded, thickly coriaceous, glabrous, dotted above; lateral nerves 10-12 on either half; base 3-nerved, cuneate or acute; petiole .3-.7 in. long, stout; stipules up to 1 in. long, ovate-lanceolate, acuminate. *Male flowers* numerous, scattered; perianth segments 3. *Gall flowers*: perianth segments about 4; style sub-terminal, elongate. *Female flowers* sessile; style lateral; stigma funnel-shaped. *Receptacle* sessile, axillary, globose, depressed at the apex, yellowish when ripe and dotted, about .7 in. across; basal bracts 3, coriaceous, cordate. *Achene* ovate, rotund, viscid.

GOALPARA, GARO HILLS. SIBSAGAR and SYLHET, K. & J. HILLS.

Fr. Cold season.

7. *Ficus elastica* Roxb. India rubber tree. Vern. *Atha-bor*, Ass.; *Chang-krang*, Duff.; *Dieng-juri*, Khasi; *Phrapramkhet*, Garo; *Dewak-arong*, Mik.; *Ka-jiri-lua*, Synt.

A gigantic tree, quite glabrous, sending down numerous aerial roots; trunk strongly buttressed, usually epiphytic under natural conditions. *Leaves* 5-12 by 2.5-.5 in., elliptic to oblong, entire, bluntly and abruptly caudate, coriaceous, shining; lateral nerves very fine, numerous, almost parallel, close, nearly at right angles to the midrib and running almost to the margins; base rounded or narrowed, obscurely 3-5 nerved; petiole .5-2.5 in. long; stipules lanceolate, flaccid, reddish, almost half as long as the leaves.

Receptacles enclosed in hooded involucre which fall leaving a saucer-shaped base under the fruit, sessile in pairs, smooth, greenish-yellow, ovoid-oblong, .5 in. long. *Male flowers* pedicelled, scattered; sepals 4, ovate; anther sessile. *Gall flowers*-sepals 4; ovary smooth; style sub-terminal, hooked. *Female flowers* mostly sessile; style long; stigma sub-capitate. *Achenes* ovoid, tubercled.

GOALPARA, KAMRUP, DARRANG, LAKHIMPUR, GARO HILLS and K. & J. HILLS (upto 3,000 ft.). Indigenous.

Also cultivated extensively since 1874 (Charduar plantation—Darrang, Kulsi plantation—Kamrup) for the yield of India rubber. At present abandoned as the exploitation of India rubber from these trees is not economic.

Flrs. Hot season. Fr. Rainy season.

8. *Ficus Benjamina* Linn. Vern. *Jari*. Ass.; *Ratke-asing*, Abor; *Thing-jaman*, Lushai; *Phrap-rakseng*, Garo; *Dieng-jiri*, Khasi.

A large tree, spreading, with drooping branches, epiphytic in early life. *Leaves* 1.5-4 by .5-2 in., ovate-elliptic or elliptic, entire, acuminate, thinly coriaceous, glabrous, shining above; lateral nerves slender, numerous, anastomosing into an intra-marginal nerve; petiole .4-.8 in. long; stipules lanceolate, about .5 in. long. *Male flowers* few, pedicellate, scattered; perianth segments 2, spatulate; anther almost sessile. *Gall flowers*-perianth segments 3 or 4, spatulate. *Female flowers* sessile; perianth segments spatulate; stigma large, sessile. *Receptacle* axillary, often in pairs, globose or ovoid, about .4 in. across. *Achene* more or less reniform.

Gauhati (G. Mann's No. 16). NOWGONG (U. Kanjilal's No. 2929), SIBSAGAR and K. & J. HILLS.

Flrs. 10-11. Fr. 4.

Var. *comosa* Kurz. Ver. *Bar-nahori-bor*, Ass.; The swamp fig.

A large tree, 4-6 ft. in girth. *Leaves* 2.8-4 by 1.3-2.5 in., ovate to ovate-elliptic, coriaceous. *Receptacle* longer, globose, about .7 in. across; perianth segments not spatulate.

Plains of ASSAM, KAMRUP (G. Mann).

Flrs. 1. Fr. 4.

9. *Ficus rhododendrifolia* Miq. Vern. *Lata-jari*, Ass.

A moderate-sized tree, often epiphytic, 5-6' in girth, glabrous except the stipules. *Leaves* 3·5-6 by 1·3-2·5 in., elliptic, oblong, ovate-elliptic, entire, acuminate, thinly coriaceous; lateral nerves 12-14 on either half, slender; base rounded or sub-cuneate; petiole short, ·4-·8 in. long; stipules about ·5 in. long. *Male flowers* few; perianth segments 2, broad and flat; anthers apiculate; filament short. *Gall flowers* sessile; perianth segments 3, lanceolate; style elongate; with small stigma. *Receptacles* axillary, sessile in pairs, globose, red when ripe, ·3-·6 in. across, with 3 broad persistent basal bracts. *Achene* triangular, minutely tubercular.

CACHAR & LAKHIMPUR.

Flrs. 10-11. Fr. 4-5.

10. *Ficus glabella* Blume.

A tree. *Leaves* 3-4·5 by 1·5-2 in., ovate-oblong, shortly acuminate, entire, thinly coriaceous, glabrous; lateral nerves 10-14 on either half; base 3-nerved, sub-acute, obtuse or rounded, joined to the petiole which is ·6-·9 in. long; stipules about 4 in. long. *Male flowers* sessile, few, near the mouth of the receptacle; perianth segments 2, ovate, hyaline; anthers sub-sessile. *Gall and female flowers* similar; perianth leaves 4, hyaline; style long; stigma obovate. *Receptacles* in pairs or rather crowded, axillary, spheroidal, purplish dark when ripe, ·2-·3 in. across, with minute basal bracts. *Achene* smooth, ovoid or spheroidal.

SIBSAGAR.

Fr. 2.

Var. *affinis*. Vern. *Dieng-kachiri*, Synt. Epiphytic (on *Quercus dealbata*). *Bark* grey, warty, ·5 in. thick; inside brownish, fibrous; wood yellowish. *Leaves* ovate-lanceolate, acuminate, shining, narrowed to the petiole. *Receptacle* purplish black when ripe, pedunculate.

GARO HILLS & KHASI HILLS (upto 3,000 ft.).

Flrs. Cold season. Fr. End of hot season.

11. *Ficus retusa* Linn. Vern. *Thapsi* or *Phrapsi*, Garo; *Silubor*, Ass.; *Chiri*, Mik.

A large evergreen umbrageous tree, often epiphytic, forming a tangled mass with aerial roots and horizontal branches, glabrous. *Bark* greyish, covered with lenticel bars, bright green underneath the corky layer; light-brown inside, mottled with red veins. *Leaves* 1·5-3·5 by ·8-2·3 in., ovate, rotund or ovate-elliptic or rhomboid, entire, acute or short-acuminate, entire, coriaceous, glabrous; lateral nerves 8-10 on either half, slender; base 3-nerved, narrowed into the petiole which is ·2-·5 in. long; stipules about ·5 in. long, lanceolate. *Male flowers* numerous; perianth segments 3, oblanceolate. *Gall flowers*-perianth segments 3, spathulate; stamen 1. *Female flowers*-perianth minute; ovary smooth; style short; stigma clavate or cylindric. *Receptacle* ·2-·3 in. across, sessile in pairs, axillary, sub-globose, yellowish when ripe, with 3 broad ovate persistent basal bracts. *Achene* ovoid or obovoid.

Common in swamps.

LAKHIMPUR, NOWGONG, KAMRUP, GOALPARA, GARO HILLS & CACHAR.

Flrs. Cold season. Fr. Hot season.

Var. *nitida*. *Leaves* ovate or rhomboid; apex bluntly acute or obtuse; narrowed at the base; all the flowers are often pedicellate.

SYLHET, KAMRUP, CACHAR (G. Mann).

12. *Ficus nervosa* Roth. Vern. *Thebu-arong*, Mik.; *Khari-pati-dimaru*, Ass.; *Uitebuk*, Tipp.; *Dieng-rop-thang*, Khasi; *Bol-chhap*, Garo.

A very large tree with a broad crown, often buttressed. *Bark* plain, greyish, whitish or brownish, pale yellow; rather granular inside with white striations. *Leaves* 3-10 by ·8-4 in., variable, slightly inequilateral, elliptic, oblong-lanceolate or elliptic-oblong, entire, shortly acuminate, thinly coriaceous, shining and glabrous above, dotted beneath and brownish (when dry); lateral nerves 9-12 on either half, anastomising into an intra-marginal nerve; base narrowed into the petiole or rounded, slightly unequal; petiole ·4-·6 in. long; stipules pubescent, about ·5 in. long. *Male flowers* pedicellate, near the mouth of the receptacle; perianth seg-

ments 3, elongate, acuminate; ovary ovoid; style short. *Female flowers* sessile, rarely pedicellate; perianth segments 3, lanceolate; stigma clavate; style twice as long as the achene. *Receptacle* axillary, pedunculate, .3-.8 in. across, without basal bracts and with 3 small bracts low down on the peduncle, slightly verrucose, sub-globose, puberulous, yellowish or reddish yellow. *Achene* ovoid, acuminate.

SIBSAGAR, NOWGONG, KAMRUP, GOALPARA, GARO HILLS, CACHAR and K. & J. HILLS.

Flrs. 10-12. Fr. Hot season.

13. *Ficus Rumphii* Bl. Vern. Bot, Sylh. *Pakhri-bor*, Ass.; *Chiri-pipli*, Mik.; *Phrap-rakseng*, Garo.

A large deciduous tree, often epiphytic. *Bark* greyish, smooth, exfoliating in hard scurfy flakes in old trees; inside light reddish-white with irregular streaks of white and faint purple. *Laves* 3-6 by 1.5-3 in., broad ovate or ovate-oblong, entire, acuminate, sub-coriaceous, quite glabrous, upper surface dotted and shining; lateral nerves 3-6 on either half; base usually 3-5 nerved, rounded, truncate or narrowed into the petiole; petiole 1.5-3 in. long, jointed with blade; stipules .5-1 in. long, ovate-lanceolate. *Male flowers* few near the mouth of the receptacle; perianth segments spatulate; stamen 1. *Female* and *Gall flowers*-perianth segments 3, lanceolate; ovary ovoid, smooth; style elongate; stigma clavate. *Receptacle* sessile, in axillary pairs, globose, .5 in. across, black when ripe, with 3 orbicular basal bracts. *Achene* minutely tubercled, mucilaginous.

SYLHET, CACHAR, GARO HILLS, KAMRUP and NOWGONG.

Lac insects are reared on it. Leaves and twigs are cattle and elephant fodder.

Ripe fruit 5-6.

14. *Ficus religiosa* Linn. The Pipul tree. Vern *Phrap-thibrong*, Garo; *Paikor*, E. Bengal. *Asvattha*, Beng. *Pippala*. Sans.

A large deciduous tree, usually epiphytic; trunk irregularly shaped. *Bark* greyish with brownish specks. *Leaves*

4·5-7 by 3-5 in., orbicular, ovate, entire or undulate, caudate-acuminate (acumen 1-3 in. long) coriaceous, glabrous, shining above, tubercled beneath; lateral nerves 6-8 on either half; veins prominent, closely reticulate; base 5-7 nerved, shallow cordate, rounded or truncate, sometimes narrowed into the jointed petiole; petiole 3-4 in. long, slender, terete; stipules minute, ovate-acute. *Male flowers* sessile, very few, often absent; perianth segments 3, ovate; stamen 1; filament short. *Female* and *Gall flowers*-perianth segments 5, lanceolate; style short, lateral; stigma round. *Receptacle* sessile, in axillary pairs, ·5 in. across, sub-globose, somewhat depressed, dark purple when ripe, with 3 pubescent coriaceous broad basal bracts.

Wild, common, generally planted near temples and wells. It is held in veneration by Hindus. Good for charcoal and packing cases. An epiphyte, destructive to forest trees. The leaves and twigs are good for elephant fodder.

Flrs. 2-4. Ripe fruit 4-6.

15. *Ficus infectoria* Roxb. Vern. *Dieng-soh-poklao*, Khasi; *Chiri-arong*, Mik.; *Dieng-chiri*, Synt.; *Tengabor*, Kamrup.

A middle-sized or large deciduous tree with spreading crown, epiphytic in early life, sometimes sending down a few aerial roots. *Bark* greyish, ·3 in. thick; blaze red, with yellow vertical lines, fibrous, turning brown. *Wood* light-yellowish or cream coloured. *Leaves* 3-8 by 1·5-3·5 in., oblong-elliptic, oblong-ovate or ovate, abruptly and shortly acuminate, entire, often undulate, rather membranous, glabrous, shining above; lateral nerves 6-9 on either half, looping within the margin; base 3-nerved, cuneate, rounded or sub-cordate; petiole up to 3·5 in. long; stipules about ·5 in. long, pubescent outside, broadly ovate. *Male flowers* stamen 1; anther broad-ovate; filaments short. *Female* and *Gall flowers*-tepals 3 or 4; stigma elongate; style short. *Receptacle* in axillary pairs, usually sessile, sub-globose, ·25-·35 in. across, occasionally larger,

tubercled, white when ripe or flushed with red and dotted; basal bracts 3, ovate or orbicular, free.

SIBSAGAR, KAMRUP and K. & J. HILLS (5,000 ft.).

Flrs. Cold season. Ripe fruit 5-6.

16. *Ficus geniculata* Kurz. Vern. *Phrap-agar*, Garo; *Phrap-so*, Kach.; *Tanga-bor*, Ass.

A large tree, glabrous, stipulately pubescent; twigs lenticellate. *Bark* brownish-grey, reticulately fissured vertically; inside light-brown, very finely fibrous. *Leaves* 3·5-8 by 1·8-4 in., ovate, ovate-oblong or oval, entire, margin slightly recurved, acuminate, rigidly coriaceous, glabrous; lateral nerves 6-12 on either half, prominent beneath, very closely elegantly and prominently reticulate between the main lateral nerves; base 3-5 nerved, rounded, obtuse or narrowed into the petiole; petiole 1·5-4 in., long, slightly channelled; stipules about ·5 in. long, pubescent, ovate-lanceolate. *Male flowers*-perianth gamophyllous; mouth oblique or split; segments 3; stamen occasionally 2; filament short. *Gall* and *Female flowers* gamophyllous, deeply 3 or 4-fid; style elongate; stigma deeply lobed. *Receptacles* axillary, solitary or paired or in pendulous clusters on raised tubercles on the stem, ·25-·3 in. across, sub-globose, depressed, verrucose, yellow when ripe; basal bracts 3, broad, mostly lobed, pubescent. *Achene* obovoid.

GARO HILLS, K. & J. HILLS, NOWGONG, N. C. HILLS & SYLHET.

Leaf scales acid, eaten cooked.

Flrs. 9-11. Fr. Hot season.

17. *Ficus clavata* Wall. Vern. *Samch-blanc*, Dieng-soh, *sormeblang-synrang*, Khasi.

An erect shrub; young parts scabrid. *Bark* greyish-brown, warty; blaze white, with yellow streaks; exuding milky juice. *Leaves* 3·5-8 by ·6-1·5 in., alternate, oblong-lanceolate or oblanceolate, abruptly acuminate or caudate, upper half coarsely toothed, lower half entire, rather thinly coriaceous, glabrous but harsh; lateral nerves 4-8 on either half; base obscurely 5-nerved, acute or cuneate; petiole ·2-·3 in.

long; stipules caducous, .3 in. long, lanceolate. *Male* and *Gall flowers* intermixed in the same receptacle, pedicellate; perianth of both gamophyllous; male monandrous. *Female flowers* on different smaller receptacles; perianth gamophyllous, campanulate, 5-toothed; style sub-terminal, elongate; stigma cylindric or obovoid. *Receptacle* axillary, solitary, globose, more or less scabrid, yellow when ripe .3 in. (globose) to .75 in. (obovoid) across; basal bracts very small; peduncles .1-.3 in. long. *Achene* ovoid, slightly papillose.

K. & J. HILLS (upto 5,000 ft.).

Flrs. 9-10. Ripe fruit 5-6.

18. *Ficus sikkimensis* Miq. Vern. *Daljhuri*, Ass.; *Jiri-aka*, *Sutarapke-tarug*, Duff.; *Thiwek*, Garo.

A small tree, sometimes epiphytic, occasionally scandent with spreading branches (U. Kanjilal); young parts puberulous. *Bark* grey, .12 in. thick; blaze brownish; wood white or cream coloured. *Leaves* 2-5 by .8-1.5 in., lanceolate or oblanceolate, bluntly and shortly acuminate, entire, membranous, almost glabrous, pellucidly punctate; lateral nerves 4-6 on either half; base 3-nerved, acute or narrowed into the petiole; petiole thick, .1-.3 in. long; stipules as long as the petiole, subulate, convolute, curved. *Male flowers*—tepals 3, hyaline; monandrous; anthers ovoid. *Gall flowers*—style tubular, latreal. *Female flowers* in different receptacle from the males and in different plants; perianth gamophyllous, 3-toothed; style short; stigma cylindric. *Receptacle* almost sessile, solitary or clustered, globose, reddish when ripe, .16 in. across; basal bracts 0 but with a few minute bracts on the middle of peduncles or lower down. *Achene* with a hyaline border all round it.

LAKHIMPUR, DARRANG, SIBSAGAR, GARO HILLS & KHASI HILLS (upto 4,000 ft.).

Flrs. 3-4. Ripe fruit 10.

19. *Ficus bhotanica* King.

An erect shrub; young parts pubescent. *Leaves* 3.5-4.5 by 1.5 in., oblong, ovate-oblong, more or less acuminate,

irregularly toothed, lobed or deeply lyrate, membranous. scabrid above, glabrescent or sparsely pubescent beneath; lateral nerves 5-7 on either half, with elegant reticulation beneath; base rounded or sub-truncate, 3-nerved; petiole .5-.75 in. long; stipules about .5 in. long, ovate-lanceolate, pubescent. *Male flowers* pedicellate; tepals 5; stamen 1 or 2; anthers broadly ovate. *Gall flowers*-perianth similar to male, large; ovary smooth; style short, sub-terminal. *Female flowers* perianth similar to male but half as long; style lateral, shorter than the ovary. *Receptacles* axillary, .5 in. across, smooth when ripe; umbilicus with long bracts; basal bracts 3, scarious, ovate, acute. *Achene* triangular, smooth.

GOALPARA, LAKHIMPUR—(Master) & DARRANG (G. Mann).

Flrs. Hot season. Fr. 7-9.

20. *Ficus obscura* Blume.

A small tree (28'/30'') with spreading crown. *Bark* dark-brown with horizontal wrinkles; inside white-mottled with yellowish-brown strand; juice more or less watery. *Leaves* 7-11 by 3-5 in., bifarious, oblong, elliptic-obovate, elliptic, often inequilateral, acuminate, dentate-serrate, membranous, harshly hispid; pubescent beneath; lateral nerves 4-6 on either half; base oblique, 3-5-nerved; petiole .3-.8 in. long; stipules hirsute, deciduous, longer than petioles. *Male flowers*—tepals 4 with 1 stamen or tepals 6 with 2 stamens. *Gall flowers*—tepals 4, lanceolate; ovary smooth, sub-globose; style lateral, short; stigma dilated. *Female flowers*—tepals 5, lanceolate (narrow) hispid inside, hyaline; style long, lateral; stigma cylindric. *Receptacles* axillary, in pairs, sometimes solitary or in clusters, rarely in fascicles from the stem below the leaves, globose or ovoid, reddish when ripe, .35-.75 in. across, minutely hispid; bracteoles present low down the peduncles; umbilical bracts prominent but no basal bracts. *Achene* orbicular-ovoid.

N. E. F. TRACT, K. & J. HILLS & GARO HILLS (upto 4,000 ft.).

Flrs. Cold season. Ripe fruit—hot season.

21. *Ficus heterophylla* Linn. Vern. *Bolowa*, Sylh.

A variable shrub, often trailing and scandent; branches brown hispid or pubescent. *Leaves* 1-4 by .5-1 in., very variable, narrow-lanceolate to broad-ovate, acuminate, lobed, irregularly dentate or repand, membranous, scabrid or hispid; lateral nerves 5-7 on either half; base rounded or cordate, 3-5 nerved; petiole .5-2 in. long; stipules about .5 in. long, glabrous, linear. *Male flowers*-perianth gamophyllous, 3-4-fid; monandrous. *Gall flowers*-perianth similar; ovary smooth; style short, lateral. *Female flowers*-perianth gamophyllous, 4-cleft. *Receptacle* axillary, solitary, pyriform or globose, hispid when young, orange-yellowish and smooth when ripe, .5-1 in. long, about .5 in. across. *Achene* subglobose, minutely tubercled (external coat hyaline), viscid.

Common on the plains on river banks of most of the localities.

Flrs. Cold season. Ripe fruit. Hot season.

Var. *scabrella*. Vern. *Soh-symmch-blanc-sur*, Khasi.

Leaves shortly petiolate, narrow, not lobed. *Receptacle* shortly pedunculate, globose or sub-pyriform.

K. & J. HILLS.

Var. *repens*. Vern. *Tarag-riube*, Abor; *Konai-dimoru*, Ass.

Leaves long petiolate, broad. *Receptacles* long pedunculate, more or less pyriform.

N. E. F. TRACT, DARRANG & NOWGONG.

22. *Ficus rostrata* Lamk. Vern. *Panthak*, Garo; *Khuntia-bor*, Ass.; *Chiri-hechu*, Mik.

A scandent or creeping shrub, very rarely erect; young part harsh. *Bark* smooth, greyish brown; blaze yellowish-white, exuding watery gum. *Leaves* 2.5-7.5 by 1-3 in., alternate, narrowly oblong, elliptic or lanceolate, abruptly caudate-acuminate, entire or sub-sinuately toothed, membranous or sub-coriaceous, glabrous and shining above, paler and harshly scabrid beneath; lateral nerves 4-6 on either half; stout and conspicuous; base 3-nerved, narrowed into the petiole or acute; petiole .2-.5 in. long; stipules subulate, minute. *Male flowers*-tepals 3; anthers elongate as long as

the filament. *Gall flowers*-tepals 3, short; ovary smooth, globose; style lateral, short. *Female flowers* gamophyllous; perianth 2-3-partite; style lateral; stigma cylindric. *Receptacles* axillary, solitary, in pairs or fascicles, subsessile or shortly pedunculate, speckled and scabrid, with basal bracts imbricate when young, brick red when ripe, .2-.3 in. across, globose. *Achene* ovoid, elongate on one side.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, NOWGONG, GARO HILLS & KHASI HILLS.

Flrs. Cold season. Ripe fruit 4.

23. *Ficus Sæmocarpa* Miq. Vern. *Phunkhu-jhola*, Mech; *Jamynrei*, Khasi.

A low spreading gregarious shrub; young shoots rusty-hirsute. *Leaves* 1-5 by .3-1.2 in., opposite, usually crowded at the ends of branchlets, oblanceolate or narrow-lanceolate, acuminate, entire or serrate along the upper half, membranous when young, thinly coriaceous when mature, glabrous above, slightly scabrid beneath, with the midrib and nerves strigose; lateral nerves 6-8 on either half; base 3-nerved, acute or narrowed into the petiole; petiole .5-1 in. long; stipules scarious, persistent, glabrous, ovate, acuminate, about .5 in. long. *Male flowers*-tepals 3-4; monandrous. *Gall flowers*-perianth hyaline; ovary smooth; style lateral, short; stigma tubular. *Female flowers* style hairy, long, slender. *Receptacles* pedunculate, solitary, usually axillary or in cluster on old stem, pyriform, globose, verrucose, hispid, with scattered bracts on the outside, 8-10 ribbed, brownish when ripe, .75-1 in. across; basal bracts 3, deciduous; umbilicus prominent. *Achene* hairy, rhomboid.

GOALPARA, GARO HILLS, N. C. HILLS & KHASI HILLS.

Common in avenues of rock along ruins or in rocky beds of hill streams.

Fr. 3.

24. *Ficus hispida* Linn. Vern. *Dumni*, Jharua; *Khoksha-dumuru*, Mech; *Panthap*, *Thiwek*, Garo; *Sakhi-bongbok-then*, Kuki; *Dieng-lapong*, Khasi; *Dumoru*, Ass.;

Bothot, Tipp.; *Dengura*, Sylh.; *Khandao*, Kach.; *Takpi-asing*, Miri; *Engthum*, Mik.; *Asi-haibong*, Manip.

A small tree or shrub with hollow branchlets (internodes). *Bark* thin greenish-grey or brownish, often warty, otherwise smooth, often with horizontal wrinkles. *Leaves* 4-12 by 2·2-4 in., usually opposite, obovate, obovate-oblong, elliptic or oblong, acute or shortly acuminate, serrate or somewhat dentate, rarely entire, subcoriaceous, hairy and scabrid above, hispid, pubescent beneath; lateral nerves including basal nerves 6-10 on either half, ascending; reticulation fine; base obtuse, rounded or subcordate, rarely cuneate; petiole hispid, ·5-2 in. long; stipules ovate-lanceolate, about ·5 in. long, pubescent externally, numerous in one set of receptacles containing gall flowers. *Male flowers*-tepals 3, broad, concave, hyaline; stamen 1; anther broad; filament short. *Gall flowers* pedicellate; perianth rudimentary or obsolete; style short; stigma dilated. *Female flowers*-perianth similar to gall flowers; style long, lateral, hairy; stigma tubular. *Receptacles* in pairs or clusters on short tubercles from old wood or on long branches, less frequently in pairs on leaf axils, ·5-1 in. across, obovoid or turbinate, narrowed to a short stalk, slightly umbonate at the top, hispid, occasionally with brown bracts scattered along the sides, greenish-yellow and faintly ribbed when ripe. *Achene* ovoid, umbilicus rather arge; basal bracts 3.

Common throughout the province.

Bark, leaves and twigs are good elephant fodder. Green fruits are used as vegetable cooked; good for liver.

Flrs. & Fr. Practically throughout the year.

25. *Ficus Cunia* Ham. Vern. *Takuk-asing*, Miri; *Soh thorling*, *Dieng-duit-lasas*, Khasi; *Kongrou*, Manip.; *Theiti*, Lushai; *Thei-chang*, Tipp.; *Thai-khrau*, Mech.; *Amin-sep*, Garo; *Dieng-jabo*, *Dieng-thylliang-sang*, Synt.

A middle-sized or small tree; young shoots hirsute. *Bark* darkish-grey, somewhat rough; blaze reddish, fibrous; with cream coloured latex. *Leaves* 4-10 in. long, variable, alternate, oblong or elliptic-lanceolate, acute or acuminate, remotely serrate, crenate or sub-entire, thinly coriaceous,

glossy green above, scabrid on both surfaces or pubescent beneath; lateral nerves 7-14 on either half; base very unequal, semisagittate or sub-cordate, with a large 3-4-nerved lobe on one side; petiole .2-.6 in. long, scabrid; stipules .7-1.5 in. long, lanceolate. *Male flowers*-tepals 3; stamen 1; anther ovate; filament short. *Gall flowers* mostly pedicellate, gamophyllous, 4-fid nearly to the base; ovary globose; style short, lateral. *Female flowers* pedicellate; perianth similar to gall flowers; lobes narrower; ovary ovoid, emarginate, minutely tubercled, viscid; style lateral, long; stigma large, bifid. *Male and Gall flowers* in one set of receptacles; female flowers in shortly pedunculate set. *Receptacles* in pairs or clusters, in axils of scales on drooping mostly leafless branches often very long from near the base of the tree or from larger branches, .4-.7 in. across, globose or pyriform, with a central aperture between the apical bracts, more or less verrucose, often with irregular bracteoles on the surface, hispid, reddish-brown or white when ripe. *Achene* mucilaginous.

Common throughout the province (upto 4,000 ft.).

Leaves are used for fodder. Fruits are edible. Lac is sometimes cultivated on its branches (Singbhum, Behar).

Flrs. & Fr. almost throughout the year.

26. *Ficus prostrata* Wall. Vern. *Dieng-doit-saw*, Khasi; *Thimisep-sangoppa*, Garo.

A small deciduous tree (25'/22'') glabrous. *Bark* greyish-brown, with vertical lines of small warts, otherwise smooth; inside faint pinkish-brown with white blotches inwards from the outer edge of the blaze. *Leaves* 3-8 by 1.2-2.5 in., alternate, lanceolate or oblong-lanceolate, acuminate, entire, membranous, shining and glabrous but pubescent along the nerves beneath; lateral nerves 12-14 on either half, slender but raised and prominent beneath; reticulations minute with minute translucent dots in their meshes; base slightly unequal, broadly cuneate; petiole .4-.8 in. long; stipules lanceolate or subulate, .6-.75 by .16-.2 in., supporting the receptacles. *Female flowers*-sepal 3-4, linear; stigma cylindric. *Receptacles* solitary or in pairs, sub-pyriform,

dark brown, warty red at the apex, with 3 basal bracts and about 6 more bracts on the body besides the apical one, all borne on long branches which spring from the trunk mostly at the base of the tree and then prostrate along the ground, .5 in. across. *Achene* minutely tubercled.

GARO HILLS, KHASI HILLS, SYLHET & CACHAR, (upto 4,400 ft.).

Flrs. 1. Ripe fruits 8.

27. *Ficus fistulosa* Reinwdt. Vern. *Kathia-dimaru*, *Mou-dimoru*, Ass.; *Ka-lapong*, Khasi.

A shrub or small tree with spreading crown; young shoots beset with a few adpressed hairs. *Bark* greyish-brown, smooth; inside light-brown and mottled. *Leaves* 3.5-9 by 1.5-3.2 in., alternate or opposite, oblanceolate, obovate-oblong or elliptic, often inequilateral, shortly acuminate, usually entire, subcoriaceous, glabrous, minutely dotted beneath; lateral nerves 5-10 on either half, purplish and prominent beneath, so are the reticulations; base 3-nerved, rounded or obtuse, often unequal; petiole .5-1.5 in. long; stipules .5-.75 in. long, scarious, ovate-lanceolate. *Male flowers* few; tepals 2-3, concave, imbricate; stamen 1; filaments long, thick. *Gall flowers*-perianth almost obsolete or very short, hyaline and gamophyllous; ovary ovoid; style short, sub-terminal; stigma funnel-shaped. *Female flowers*-perianth similar to gall flowers; style lateral; stigma cylindrical. *Receptacles* dimorphous, axillary and short peduncled, in some undivided, in others in dense bunches on stem and branches and long peduncles containing only fertile female flowers, sub-pyriform, glossy green when young, depressed globose, glabrous with pale green speckles, .5-1 in. across; basal bracts 3. *Achene* obliquely ovoid, minutely tubercled.

LAKHIMPUR, SIBSAGAR, CACHAR and K. & J. HILLS.

Flrs. 2-3.

28. *Ficus hirta* Vahl. Vern. *Dieng-soh-rompian*, Khasi; *Indew-ching*, Naga; *Khandou-jalla-phang*, Kach.; *Chhakhab*,

Garo; *Dieng-soh-lapong*, Synt.; *Khongal-dimoru*, Kamrup; *Nabuk*, Kuki.

A small tree or shrub; branchlets hollow; young parts tawny or rusty-pubescent or tomentose. *Bark* warty with horizontal wrinkles; inside light brownish-white, mottled deeper brown. *Leaves* 5-12 by 4-8 in., variable, broad-ovate, sub-orbicular or ovate-elliptic, acuminate, serrate, 3-5-lobed or entire, scabrid above, densely hirsute, pubescent or tomentose beneath specially on the nerves; lateral nerves 4-7 on either half; base rounded or cordate, 3-7-nerved; petiole 1-7 in. long, hirsute; stipules .5-.75 in. long, ovate-lanceolate, acuminate. *Male flowers*-tepals 4; stamens 2, occasionally 3, sometimes 1. *Gall flowers*-tepals 4, globose or ovoid, smooth; style lateral, short; stigma funnel-shaped. *Female flowers*-tepals 4, linear-lanceolate; style filiform; stigma cylindric. *Receptacle* axillary, in pairs, globose or ovoid, .3-1 in. across, covered with long rufescent hairs; basal bracts pubescent. *Achene* minutely tuberculate, ellipsoid.

N. C. HILLS, K. & J. HILLS, LAKHIMPUR, SYLHET, CACHAR, GARO HILLS & KAMRUP, (upto 5,000 ft.).

Tender leaves are used as vegetable; ripe fruit eaten.

Flrs. 11. Ripe fruit hot season.

Var. Roxburghii Miq. Receptacle large .5-1 in. across. *Leaves* ovate, rotund, often deeply lobed.

KHASI HILLS.

29. *Ficus pyriformis* Hk. & Arn. Vern. *Soh-doit-um*, *Ja-myn-rei-synrang*, Khasi.; *Khuaishi-phang*, Kach.; *Dieng-jalakhma*, Synt.

A shrub or a small tree (up to 20' high); branches conspicuously marked with scars of fallen leaves; young parts pubescent. *Bark* greyish, smooth; blaze whitish. *Leaves* 1.5-4.5 by .3-.7 in., narrow-lanceolate or oblanceolate, acuminate, entire, recurved, sub-coriaceous, glabrous with scattered dots above and sparsely pubescent on the nerves beneath; lateral nerves 6-12 on either half, slender; reticulation elongate and conspicuous beneath; base 3-nerved, narrowed into the petiole or obtuse; petiole reddish-brown,

·3-·6 in. long; stipules subulate, glabrous, ·2-·4 in. long. *Male flowers*—tepals 3; stamens 2; anthers ovate. *Gall flowers* pedicellate; tepals 4; ovary globose, smooth; style short, lateral; stigma tubular, dilated. *Female flowers* on separate receptacle, tepals 5; style long, sub-terminal, slender. *Receptacle* pedunculate, axillary, solitary, pyriform, constricted at the base into a stipe, reddish-brown, spongy when ripe, ·4-·7 in. across; bracts 3 at the junction of the stalk; peduncle ·5-1·25 in. long. *Achene* reniform, minutely tubercled.

K. & J. HILLS, N. C. HILLS, CACHAR, SYLHET & LAKHIMPUR (upto 4,000 ft.).

Flrs. Cold season. Fr. End of hot season.

Var. Sub-pyriformis. *Leaves* linear-lanceolate, pubescent beneath. *Receptacles* and peduncles pubescent.
KHASI HILLS, ASSAM.

Var. ichnopoda. *Leaves* glabrous. *Receptacle* glabrous; peduncle elongated.

SYLHET, LUSHAI HILLS, LAKHIMPUR & K. & J. HILLS.

30. *Ficus erecta* Thunb.

A shrub or a small tree. *Leaves* 3-8 in. long, ovate-obovate or ovate-elliptic, entire or obscurely serrate, acuminate, glabrous or scabrid above, hispid and minutely tuberculate beneath; lateral nerves about 8 on either half; base 3-nerved, truncate, rounded, sub-cordate, sometimes slightly unequal; petiole ·5-2 in. long; stipules ·3 in. long. *Male flowers* shortly pedicelled or sub-sessile; perianth of 3 pieces, lanceolate; stamens 1-3. *Gall flowers*—perianth as in male; ovary globose; style lateral; stigma dilated. *Female flowers*—perianth of 4 pieces, sub-sessile; style lateral; stigma bilobed. *Receptacles* pedunculate, in axillary pairs, depressed globose, about ·5 in. across when ripe; base often much constricted into a stipe to the peduncle, which is upto 1 in. long; basal bracts 3, ovate, triangular.

KHASI HILLS (Gustav Mann.).

Flrs. 9-10.

31. *Ficus silhetensis* Miq. Vern. *Soh-syrmch-blang*, *Dieng-sormeblang*, Khasi; *Bhuin-khannah*, Nep.

A shrub, sometimes a small tree, rarely straggling; young parts pubescent. *Bark* ashy-grey, smooth; blaze greenish white. *Leaves* 2.5-5 by .6-2.5 in., oblanceolate, elliptic-lanceolate or elliptic, entire, minutely undulate, acuminate, membranous, glabrous; lateral nerves 4-8 on either half, slender, stout; reticulation fine; base rounded, 3-nerved; petiole .3-1.2 in. long, hairy; stipules about .5 in. long, glabrous, lanceolate. *Male flowers* pedicellate; tepals 3; stamens 2; anthers elongate. *Gall flowers*-tepals 3; ovary smooth; style short, lateral. *Female flowers* almost sessile, tepals 3; style long, lateral, curved. *Receptacle* axillary, solitary or in pairs, globose and reddish when ripe, about .3 in. across; basal bracts 2, minute. *Achene* obovoid, flattened, papillose, purplish, variegated.

SYLHET, CACHAR, GOALPARA and K. & J. HILLS (upto 4,000 ft.).

Flrs. 9-10. Ripe fruit. Hot season.

32. *Ficus lepidosa* Wall. Vern. *Dìmoru*, Ass.; *Ingle-arong*, Mik. *Dieng-ka-japo*, *Dieng-thalliang*, Khasi; *Mumukichok*, Naga; *Bolmetap*, *Bol-khan-thap*, Garo; *Dumru-jola*, Mech.

A small or middle sized tree (40'/32''); young parts pubescent. *Bark* brownish-grey, faintly reticulately fissured, .25 in. thick; inside yellowish-brown, granular, mottled with darker brown especially along the edges of the blaze. *Wood* yellowish. *Leaves* 3-10 by 1.5-4.5 in., ovate, ovate-elliptic or lanceolate, acute or acuminate, entire, membranous, almost glabrous above, pale grey and sparsely pubescent beneath along the nerves; lateral nerves 8-12 on either half; reticulation fine, distinct; base 3-nerved, usually rounded; petiole .5-2 in. long; stipules lanceolate, about .5 in. long. *Male flowers*-tepals 4; stamen 1; filament adnate. *Gall flowers* ovary smooth, globose; style lateral; stigma tubular. *Female flowers*-tepals 4-5; style sub-terminal; stigma cylindric. *Receptacles* axillary, solitary or in pairs, peduncled, ellipsoid, globose or sub-pyriform, orange-red when ripe, about

·5 in. across; basal bracts 3, spreading; peduncle ·2·5 in. long, pubescent. *Achene* oblong, oblique, rugose.

SIBSAGAR, LAKHIMPUR, K. & J. HILLS, GARO HILLS, GOALPARA & CACHAR.

Ripe fruit 4.

Var. martabanica. Leaves elongate, lanceolate, acuminate, (ASSAM, King).

33. *Ficus nemoralis* Wall. Vern. *Dimoru*, Ass.; *Sohrom-blang*, Synt.; *Dieng-surme-blang*, Khasi; *Katia-dimoru*, Lakhimpur.

A small handsome tree. *Bark* thin, greyish-brown, fairly smooth, glabrous. *Leaves* 2-6 by ·6-2·5 in., slightly inequilateal, lanceolate, ovate-lanceolate or elliptic, sharply acuminate, entire, membranous, glabrous; lateral nerves 7-12 (rarely more) on either half; reticulation distinct and dark coloured beneath; base 3-nerved, usually cuneate or narrowed into the petiole; petiole ·5-1·5 in. long, slender; stipules ·3·6 in. long, convolute, glabrous. *All flowers* in the same receptacle. *Male flowers* pedicellate, numerous near the mouth of the receptacle; stamens 2-3. *Female and Gall flowers*-tepals 3, ovate-lanceolate; ovary ovoid (gall); ovary triangular-obovoid and style more lateral and longer than the gall flowers (female). *Receptacle* axillary, solitary or in pairs, ·2·3 in. across, glabrous, sub-globose, reddish when ripe, supported by 3 connate persistent broad basal bracts; umbilicus prominent. *Achene* minutely wrinkled, rotund.

LAKHIMPUR, SIBSAGAR and K. & J. HILLS (upto 5,000 ft.). Fruit edible. The leaves are lopped for cattle fodder.

Ripe fruit cold season.

Var. *Fieldingii* Miq. Vern. *Soh-kyrmet-blang*, Khasi. Leaves narrow 2·6·5 by ·8-2·3 in., bifarious, long acuminate. *Receptacle* shortly pedunculate.

KHASI HILLS (Nos. 7399 & 5988, U. N. Kanjilal).
Fodder for goats.

34. *Ficus lævis* Bl.

An epiphytic climber, rarely shrubby. *Bark* greyish; blaze greenish. *Leaves* 4-10 by 3-8 in., rotund, broadly ovate or elliptic, cuspidate, obscurely dentate or entire, membranous; lateral nerves 9-11 (including basal) on either half, puberulous or pubescent above, glabrous beneath; base 5-7 nerved, rounded to cordate, rarely sub-cuneate; petiole .8-3 in. long, rarely abnormally long (7.5"); stipules .3-.5 in. long, ovate-lanceolate. *Male flowers* near the apex with galls; tepals 5, linear-lanceolate; stamens 2-3, elongate. *Gall flowers*-style short, terminal or sub-terminal; stigma dilated. *Female flowers* pedicellate; style terminal; stigma bifid. *Receptacle* pedunculate, solitary, axillary, globose or sub-pyriform, .5-1 in. across, greenish-yellow when ripe; umbilicus broad; basal bracts 3, small; peduncles .6-1 in. long. *Achene* globular or elongated.

LAKHIMPUR, K. & J. HILLS & CACHAR (upto 5,000 ft.).

Flrs. Cold season. Fr. Hot season.

Var. *assamica*. Shrubby. *Leaves* very broad, puberulous, rather coriaceous. *Receptacles* in pairs; peduncles about 1.5 in. long, stout.

CACHAR, KHASI HILLS, DUFFLA HILLS, LAKHIMPUR.

35. *Ficus scandens* Roxb. Vern. *Khrām-barat*, Garo; *Bongpur doukha*, Kach.; *Lata-dimaru*, Ass.

A scandent shrub, often rooting at the nodes, sometimes climbing. *Bark* thick, darkish, rough; blaze white with red streaks. *Leaves* 2-3.5 by 1.2-2 in., alternate, ovate or elliptic, acute, entire, coriaceous, scabrid above, pubescent beneath; lateral nerves 4-6 on either half, prominent beneath; reticulations very fine; base rounded, 3-nerved; petiole .3-.5 in. long; stipules .25 in. long, ovate, acuminate. *Male flowers* sessile near the apex with gall flowers; tepal 4, broad; stamens 2; anthers broadly ovate. *Gall flowers* pedicellate; tepals 4, lanceolate; style short, thick, sub-terminal; stigma hooked. *Female flowers* in separate receptacle; tepals 4, linear; style elongate; stigma subcapitate. *Receptacle* pedunculate, solitary or in pairs, axillary, globose, .35 in. across, rough, often hairy outside, greenish-yellow when

ripe; peduncle .3-.6 in. long; basal bracts 3, ovate, persistent. *Achene* oblong, smooth.

Common throughout the province (upto 4,000 ft.).

Flrs. Hot season. Ripe fruit. Rainy season.

36. *Ficus foveolata* Wall. Vern. *Ka-jiri-sim*, Synt.; *Soh-kyrmoit-kroh*, Khasi.

An evergreen scandent epiphytic shrub, rooting at the nodes, often climbing; young parts pubescent. *Leaves* 3-6 by 1-2 in., alternate, ovate-elliptic, oblong or lanceolate, acuminate, entire, membranous or thinly coriaceous, glabrous above, glabrescent or pubescent beneath; lateral nerves 5-8 on either half, prominent beneath; base rounded, sub-cordate or cuneate, 3-nerved; petiole .5-.8 in. long, hairy; stipules .5 in. long, hairy outside. *Male flowers* pedicellate; tepals 4; stamens 2. *Gall flowers* pedicellate; tepals 4; ovary smooth; style short; stigma dilated. *Female flowers*-tepals 4; style elongate, sub-terminal. *Receptacles* axillary, solitary, globose or ovoid, more or less umbonate, purplish when ripe, when globose about .5 in. across, when ovoid about .8 in. across; basal bracts 3, membranous, reflexed. *Achene* more or less reniform, minutely papillose.

K. & J. HILLS (upto 4,500 ft.).

Flrs. & Fr. Cold season.

***Ficus foveolata* Wall.** Var. *oleæformis* King.

A creeping shrub. *Leaves* 1.5-2 by 4-5 in., oblong-lanceolate, caudate-acuminate; base rounded; petiole .3-.5 in. long. *Receptacle* ovoid, about 1 in. long, upto .8 in. across, pale-yellowish.

KHASI HILLS.

Fr. 11.

37. *Ficus ramentacea* Roxb.

A powerful epiphytic climber, at times a tree (60 ft. tall). *Leaves* 3-8 by 2.5-3.8 in., elliptic or ovate, entire, acute or sub-acuminate, coriaceous, glossy, bright green, almost glabrous except on the nerves beneath; lateral nerves 5-8 on either half, prominent beneath, lower pairs basal;

base rounded, sometimes cordate; petiole .6-1.5 in. long. *Male flowers*-sepals 2-3; filaments short; anthers 2, elongate. *Female flowers*-perianth united below; segments 3; style elongate, lateral; stigma cylindric. *Receptacle* axillary, solitary or clustered, sessile or short-peduncle, sub-globose, .25-.5 in. across, narrowed at base, glabrous. *Achene* ellipsoid.

LAKHIMPUR, DARRANG, CACHAR, SYLHET and K. & J. HILLS.

Flrs. Cold season. Fr. 4-5.

38. *Ficus crininervia* Miq.

A scandent shrub; stem and branches rooting; young parts densely silky with long twany-deciduous hairs. *Leaves* 5-10 in. long, ovate-oblong or ovate-elliptic, entire, slightly revolute, acuminate or shortly cuspidate, coriaceous, glabrous but covered with minute deciduous scales above, covered with silky hairs on the midrib and nerves beneath; lateral nerves 5-6 on either half; reticulation fine; base 5-7 nerved, cordate or sub-sagittate; petioles .5-1.25 in. long, hirsute; stipules flaccid, linear-lanceolate, .6-1.4 in. long. *Male and Gall flowers* unknown. *Female flowers* perianth of 4 peices enveloping the pistil except the stigma; style short, sub-terminal; stigma large, lanceolate. *Receptacle* .3-.5 in. across, solitary or in pairs, shortly pedunculate, obovoid or globose, constricted towards the base; basal bracts absent; apex slightly umbonate. *Young achene* obliquely ovoid.

ASSAM. (No specimen in Forest Herbarium, Shillong). F. B. I. Vol. V., P. 529.

39. *Ficus Roxburghii* Wall. Vern. *Mondimaru*. *Autha-dimaru*, Ass.; *Thaibar-phang*, Kach.; *The-bol*, Garo; *Kukbal-takuk-asing*, Miri; *Dieng soh-shied*, *Dieng-soh-lampin*, Khasi; *Lothebi-arong*, Mik.; *Nai-milay-thing*, Kuki.

A middle-sized tree with a spreading crown; young parts pubescent; young twigs hollow. *Bark* greyish, rough, warty; blaze reddish with white vertical lines. *Leaves* 5-14 by 4-11 in., broad, ovate-orbicular, ovate or rounded, acute or mucronate, entire or toothed, sub-coriaceous, glabrous or glabrescent above, softly pubescent beneath; lateral nerves 3-5 on

either half, joined by transverse veins; base 5-7 nerved, usually deeply cordate; petiole 1-6 in. long, rarely more; stipules .5-1 in. long, ovate-lanceolate, pubescent. *Male flowers* tepals 3, broad, hyaline imbricate; stamens 2-3. *Gall flowers* pedicellate; perianth 2-3-cleft nearly to the base; ovary ovoid; style sub-terminal; stigma dilated. *Female flowers*-perianth similar to gall flowers; style hairy, long, curved, lateral; stigma cylindric. *Receptacles* in fascicles on short thick leafless branchlets borne on the big branches or trunk often much low down, turbinate, often depressed, longitudinally 8-12 ribbed, often as large as 2' long and 3' across, purplish-orange when ripe; basal bracts 3, triangular or ovate, large. *Achene* minutely tubercled, viscid.

Common throughout the province (upto 5,000 ft.).

Fruit is eaten; the leaves are used for elephant and cattle fodder.

Ripe fruit 4-6.

40. *Ficus pomifera* Wall. *Takuk-asing*, Miri.

A tree, sometimes quite a small tree; young parts pubescent. *Bark* greyish thin; blaze light-red, exuding gummy latex. *Leaves* 3-8 by 1-3 in., elliptic or broadly lanceolate, ovate-elliptic, usually acute, coarsely and irregularly serrate, subcoriaceous, glabrous (puberulous when young) above, minutely hairy or glabrous beneath; lateral nerves 3-7 on either half, prominent below; base 3-5 nerved, rounded or sub-cuneate; petiole 1-3 in. long; stipules .5-.8 in. long, ovate-lanceolate. *Male flowers*-tepals 3, membranous; stamens 2. *Gall flower*-perianth gamophyllous, 3-toothed; ovary smooth, ovoid; style short, sub-terminal; stigma dilated. *Female flowers*-perianth similar to gall flowers; style long, lateral; stigma clavate. *Receptacle* peduncled, in branched fascicles on short leafless branches or tubercles from the trunk or larger branches, sometimes from base, sub-globose or more or less pyriform, depressed, reddish or brownish, red when ripe, 1-1.5 in. across; basal bracts 3, ovate, acute; peduncles 1-2.5 in. long. *Achene* fairly papillose.

N. E. F. TRACT, SIBSAGAR and K. & J. HILLS (upto 4,200 ft.).
Ripe fruit is eaten greedily.

Fr. 1.

41. *Ficus glomerata* Roxb.

A large deciduous tree; young parts pubescent. *Bark* greyish-brown, smooth. *Leaves* 4-7 by 1·5-2·7 in., ovate-elliptic, ovate-oblong or oblong-lanceolate, bluntly acuminate, entire, membranous, glabrous, with numerous minute dots on the lower surface; lateral nerves 4-10 on either half; base 3-nerved, obtuse or acute; petiole ·6-1 in. long; stipules ·6-·8 in. long, ovate-lanceolate. *Male flowers*-tepals 3-5, membranous, inflated; anthers 2; filaments united. *Gall flowers* pedicellate; perianth gamophyllous, irregularly toothed; stigma clavate. *Female flowers* almost sessile; perianth gamophyllous, 4-5 toothed; segments lanceolate; style subterminal; stigma clavate, (all kinds of flowers in the same receptacle). *Receptacles* peduncled, in short paniced fascicles from the trunk and larger branches, rarely axillary, sub-globose or pyriform, reddish or orange when ripe, 1-1·5 in. across; basal bracts 3, small, triangular, ovate. *Achene* minutely tubercled.

Common throughout the province (upto 4,000 ft.).

But there is one specimen from K. & J. Hills, No. 2670 (U. N. Kanjilal).

Ripe fruit 4-7.

42. *Ficus lanceolata* Ham.

A much branched shrub or small tree, almost glabrous. *Leaves* 4-8 by ·9-1·5 in., lanceolate or narrow-lanceolate, entire or occasionally very remotely serrate, acuminate, subcoriaceous, glabrous but minutely granulate beneath; lateral nerves 6-8 on either half; base 3-nerved, rounded; petiole ·4-1 in. long; stipules about ·5 in. long, lanceolate. *Male flowers* shortly pedicelled, numerous near the mouth; perianths 3 or 4, large, inflated; anthers 2, ovate; filaments short. *Gall flowers*-perianth similar to female; ovary ovoid; style short, subterminal; stigma dilated. *Female flowers*-perianth short, gamophyllous, 3-toothed; style elongate, lateral; stigma clavate. *Receptacles* glabrous in fascicles of 5-8 on the old wood and large branches, pyriform when young, turbinate and purplish when ripe, 1-2 in. across,

warty; basal bracts 3, small. *Achene* obliquely ovoid, minutely tubercled.

K. & J. HILLS (upto 4,000 ft.).
Fruits edible and very palatable.

Flrs. Hot season. Fr. 5-6.

43. *Ficus Clarkei* King.

A tall tree. *Bark* whitish; young shoots hispidly scabrid. *Leaves* 6-10 by 2-3·2 in., inequilateral, oblong or narrow-elliptic, entire or with a few coarse tooth near the apex, acuminate, coriaceous, glabrous, minutely tubercled beneath; lateral nerves 6-8 on either half; prominent beneath; base 3-nerved, cuneate or acute, oblique and unequal sided; petiole ·2-·4 in. long; stipules lanceolate, convolute, ·4-·5 in. long. *Male flowers*-perianth of 3 membranous imbricate segments; stamens 2 or 3; anthers ovate, apiculate. *Gall flowers*-perianth gamophyllous, 3-cleft; segments linear, lanceolate; ovary ovoid, slightly tubercled; style lateral, thickened below; stigma cylindric. *Receptacles* in bracteate panicles on old wood or branches, pedunculate, pyriform, red when ripe, about 1 in. across; the base constricted into a long stipe; basal bracts 3, ovate-lanceolate.

KHASI HILLS (500 ft.). (C. B. Clarke).
No specimen in Forest Herbarium, Shillong.

F. Wardii C. E. C. Fischer.

A small tree. *Leaves* alternate, 7·8 by 3·8 in., ovate or elliptic, acute, cuspidate, chartaceous, glabrous; Lateral nerves 14-16 on either half; base rounded, truncate or broadly cuneate; petiole ·4-1·75 in. long, shallowly channelled; stipules ·4-·5 in. long, lanceolate, acuminate, glabrous. *Male flowers*—pedicel ·4-·5 in. long; perianth segments 3, ·4-·5 in. long, red, boat-shaped, acute, keeled; stamens 2; filaments very short; anthers short, 2-celled; cells margined. *Gall flowers* sessile or nearly so; perianth-segments 3, red, lanceolate, acute, ·4-·5 in. long; gall stipitate, sub-globose; style lateral; stigma capitate, puberulous. *Receptacles* sessile, usually in pairs, nearly globose, shortly pedunculate, 1-1·1 in. across, brown, minutely puberulous.

Delei Valley (Kingdon Ward 8048) 6-7,000 ft. (Kew Bull. 956, p. 281).

Flrs. 4.

F. xiphias C. E. C. Fischer.

A small shrub or tree. *Leaves* alternate, 1·2 by ·1 in., narrowly elliptic, oblong, acute, chartaceous; lateral nerves 12-22 on either half; petiole slender, ·4 in. long, ultimately glabrous; stipules deciduous, ·5 in. long, narrowly lanceolate, acuminate, glabrous. *Male flowers*—perianth segments 3-4, boat-shaped, obtuse, reddish; stamens 1-2; anthers as big as filaments; pistillode minute. *Gall flowers* sessile; perianth-segments 4, oblong, boat-shaped, often curved; style lateral, not reaching the apex of the gall, with straight or recurved linear appendage from the side of the rounded apex facing the gall. *Receptacles* usually 2, in the axils of the leaves, globose on maturity, sharply umbonate, ·4 in. across.

Delai Valley (Kingdon Ward 8224). (Kew Bulletin 1936, p. 282).

Flrs. 5-8.

2. ARTOCARPUS Forst.

Evergreen trees with milky juice. *Leaves* alternate, coriaceous, entire, lobed, penninerved; stipules usually leaving a prominent and annular scar. *Flowers* monœcious, densely crowded on globose or variously shaped, usually solitary, axillary. *Receptacles* often mixed with scale-like or peltate bracts. *Male flowers*—perianth 2-4 lobed or partite; lobes concave, valvate or sub-imbricate; stamen 1, erect; pistillode absent. *Female flowers*—perianth tubular, confluent below with the receptacle; limb minute. *Ovary* straight; style central or lateral; stigma entire, rarely 2-3-fid; ovule pendulous. *Fruit* a much enlarged fleshy irregularly oblong cylindric or globose syncarp, covered superficially with the thickened and fleshy perianth and apically spinous or otherwise hardened carpels; the achenes deeply sunk in. *Seeds* often large; exalbuminous; embryo straight or incurved; cotyledons fleshy, equal or unequal; radicle superior, short.

Syncarp tubercled :—

Stipules amplexicaul :—

Syncarp globose :—

Leaves scabrid. 1. *A. Chaplasha*.

Syncarp not globose (oblong) bigger, hanging on short stalks :—

Leaves smooth, shining. 2. *A. integra*.

Syncarp not tubercled (smooth):—

Stipules not amplexicaul:—

Leaves pubescent beneath:—

Fruit globose, velvety, yellow when
ripe, 2-4 in. across. .. 3. *A. Lakoocha*.

Leaves entirely glabrous:—

Fruit globose or ovoid, smooth,
·7-1·25 in. across. .. 4. *A. Gomeziana*.

1. Artocarpus Chaplasha Roxb. Vern. *Tat-pong*, Lush., Tipp.; *Kathlicham*, Sylh.; *Sam*, Ass.; *Dieng-laram*, *Dieng-soh-ram*, Khasi; *Phong-arong*, Mik.; *Chirum*, Naga; *Bol-sram*, Garo; *Cheram-phang*, Kach.

A very large deciduous tree (150'/15'); young shoots dotted with long stiff hairs. *Bark* greyish-brown, with large white patches and deep vertical furrows peeling off in pieces, older bark when removed exposes a brown surface; cork ·25 in. thick; inner bark 1 in. thick; blaze brown; latex milky, copious; leaves of seedlings and saplings or young shoots pinnatifid or lobed. *Leaves* 6-12 by 3-7 in., elliptic-ovate or sub-rotund, entire or minutely dentate-serrate, obtuse or rounded or slightly cuspidate, thinly coriaceous, sparsely hispid above, hispid-pubescent beneath; lateral nerves 6-10 on either half; midrib and reticulation distinct, pilose or hispid; base sub-cordate, rounded; petiole ·5-1 in. long, hispid-tomentose; stipules large, amplexicaul. *Receptacle* axillary, globose; peduncles long, puberulous. *Male flowers* sessile, mixed with scales; perianth segments oblong, pubescent, bifid at the apex; anthers exserted, 2-celled; receptacular scales peduncelled, hairy above. *Receptacles* globose, not lobulate, tuberculate, pubescent, 3-4 in. across; apice of anthocarp free, pubescent. *Seeds* few, ovoid, ·75 in. long.

Fairly common throughout the province.

Wood moderately hard, even grained, durable, very refractory in seasoning (sawn timber); should be seasoned in logs and then sawn up.

Medullary rays short, fine and moderately broad. Pores large and moderate-sized, uniformly distributed (Gamble).

Takes creosote impregnation well; one of the best treated sleepers; used for dug-outs in the Province; fetches very good prices.

Flrs. 3-4. Fr. Rainy season.

Artocarpus integra Thunb. (1776) Syn. *Artocarpus integrifolia* Linn. (1781). Vern *Jang-phong-arong*, Mik.; *Dieng-soh-phan*, Khasi; *Kathal*, Ass., Beng. The jack fruit tree.

A large evergreen tree with large dense crown; young shoots with stiff hairs. *Leaves* 3-8 by 1·5-3 in., elliptic, obovate, entire (lobed sometimes in young plants) shortly acuminate, coriaceous, glabrous, dark green and glossy above, pale and rough beneath; lateral nerves 5-8 on either half; base narrowed into the petiole which is ·3-1 in. long; stipule sheathing, prominent, leaving annular, scars on the branchlets. *Flowers heads* in bud enclosed in large leathery deciduous stipulate sheaths. *Male receptacle* cylindric, 2-6 in. long; sepals 2. *Syncarp* (fruiting receptacle) 12-30 in. long, covered with pointed tubercles hanging on short stalks. *Seeds* about 1 in. long, oblong, farinaceous.

Cultivated throughout the province, also commonly found in evergreen forests of UPPER ASSAM as escapes. (38-41 lbs. per c.ft.).

The wood is used for furniture, carpentry, boxes. The wood is at first yellowish and later somewhat resembles *Mahogany*. A yellow dye is extracted from decoction of heart wood chips with leaves of tamarind and is used for dyeing Endi-silk. The green young fruits and ripe seeds are eaten cooked as vegetable. The sweet and flavoured pulp of the fruit is also eaten throughout India.

Flrs. 2-4. Fr. 7-9.

3. Artocarpus Lakoocha Roxb. Vern. *Tat-tak*, Kuki; *Dewa-cham*, Sylh., Cach; *Dewa-sali*, Bohot, ;Ass.; *Heiru-kothong*, Manip.; *Liusik-salia*, Miri; *Tatte*, Tipp.; *Armū*, Garo; *Dieng-soh-ram*, Khasi.

A large deciduous tree with a large spreading crown; young parts tomentose. *Bark* dark-brown, exfoliating in small round woody plates; inside reddish, softly fibrous, with faint streaks of white latex; milky juice copious. *Leaves* 4-12 by 2-6·5 in., elliptic or broadly oblong, entire, abruptly and shortly acuminate, acute or obtuse, coriaceous, glabrescent and rough above, softly pubescent beneath; lateral nerves 6-14 on either half; tertiaries prominent; base attenuate, rounded or obtuse; petiole ·5-1·5 in. long. *Receptacle*

axillary, globose on short pubescent peduncles. *Male receptacles* .5-1 in. across, puberulous; perianth segments 2 (rarely 3) triangular, truncate, puberulous; anthers exserted, 2-celled, longitudinally dehiscent. *Female receptacle* .12-4 in. across, irregularly lobulate; velvety, yellow or orange-red when ripe, wrinkled or smooth; style protruding. *Anthocarp* completely united. *Seeds* broad, about .5 in. across.

Common throughout the Province, often cultivated in villages.

The bark is chewed with Pan (betel). The ripe fruits are edible.

The male flower heads are pickled. The wood resembles that of *A. integra*, but is somewhat inferior, takes a good polish and seasons well (weight about 36 lbs. per c.ft.).

Flrs. 2-5. Fr. Rainy season.

4. *Artocarpus Gomeziana* Wall. Vern. *Sonapaticham*, Sylh.; *Tat-pong*, Tipp.; *Kharika-dewa*, Ass.

A tall evergreen tree; young shoots puberulous. *Bark* covered with grey papery soft cork which splits into parallel vertical fissures; inside light-red with streaks; milky latex copious. *Leaves* 4-9 by 1.5-3.5 in., oblong or ovate-lanceolate or ovate-oblong, usually entire, acute or acuminate, cuspidate, coriaceous, shining, glabrous, smooth above, sometimes sub-pruinose beneath; lateral nerves 7-12 on either half, stout and prominent below; so are the midrib and reticulations; base attenuate, obtuse or rounded; petiole .2-.5 in. across. *Flowers* intermixed with numerous pedicellate peltate scales; perianth segments 2, ovate, pubescent; stamen 1; filaments dilated at the apex; anthers exserted; cells transversely dehiscent, divergent. *Female* receptacle globose or ovoid, .75-1.25 in. across. *Anthocarp* completely united, only a few bearing seeds.

LAKHIMPUR.

The timber is said to be quite valuable.

Flrs. 6-10. Fr. 1-3.

Var. *Griffithii*. *Leaves* 3-6 by 1.1-8 in., elliptic-lanceolate or elliptic-oblong, smaller in all its parts than the *forma typica*.

LUSHAI HILLS (B. Sen Gupta's No. 7643).

Flrs. 7-9. Fr. 7-3.

3. CUDRANIA Tredul.

Shrubs or small trees, scandent or erect. *Leaves* alternate, entire, penninerved; stipules small, lateral. *Flowers* diœcious, sessile, in small globose receptacles, bracteolate. *Male flowers*-tepals 3-5, imbricate, oblong, obtuse, adnate to the bracts; stamens 4, erect, more or less adnate to the tepals; pistillode subulate or obsolete. *Female flowers*-tepal broader than the male, distinct, embracing the ovary. *Ovary* straight; style simple or 2-partite, one arm often slender or rudimentary; ovule pendulous. *Fruit* of numerous achenes, enclosed in the enlarged and fleshy pseudocarp formed of the accrescent bracteoles and perianth. *Achenes* compressed, crustaceous; testa membranous; albumen scanty; cotyledons twisted or folded, equal or unequal, embracing the slender ascending radicle.

Young branches pubescent :—

Leaves upto 3·5 in. long, obtuse or acute :—

Lateral nerves	6-10	on either half,	
slender.	..	..	1. <i>C. javanensis</i> .

Young branches glabrous :—

Leaves upto 6 in. long, caudate-acuminate :—

Lateral nerves	3-5	on either half, pro-	
minent beneath.	..	..	2. <i>C. fruticosa</i> .

1. *Cudrania javanensis* Trecul. Vern. *Puli-kaint*, Ass.; *Takum-asing*, Miri; *Pumi-leki*, Daff.; *U-sia-kiang*, *U-ther-sia-hati*, Khasi; *Bopou-chuni*, Mik.

A large rambling or subscandent evergreen spinous shrub or a small tree; young shoots pubescent. *Bark* smooth, lenticellate, yellowish-brown or cinerous, exfoliating in thin flakes; thorns axillary, straight or somewhat curved; latex profuse, pale yellow. *Leaves* 1·3-5 by 7-2 in., variable, elliptic-obovate or oblong-elliptic, mucronate, rounded, acute or obtusely acuminate, entire, coriaceous, glabrous, dark-green above, paler beneath; lateral nerves 6-12 on either half, slender, pairs forming intramarginal loops; base usually acute, sometimes sub-obtuse; petiole 1-3 in. long (Local specimen); stipules minute. *Flower heads* 2-3 in. across, greenish or yellowish. *Male flowers* yellow; tepals usually 5, obovate, inflexed at the tips. *Female*

flower heads .3 in. across; tepals 4, obovate-oblong, thickened and softly tomentose at the tips. *Fruit* globose, 1-1.2 in. across, velvety and orange when ripe.

Common throughout the province.

Ripe fruits are eaten. The heart wood gives a yellow dye.

Flrs. 4-6. Fr. 7-11.

2. *Cudrania fruticosa* Wight. Vern. *Dieng-shih-thnat*, Synt.

A scandent or rambling shrub; stem yellowish-green; branches glabrous, greyish, lenticellate; spines curved; latex milky. *Leaves* 1.5-6.5 by .8-1.5 in., lanceolate, elongate-elliptic or somewhat oblong, entire, abruptly caudate-acuminate, rather membranous, glabrous; lateral nerves 3-5 on either half, stout, prominent beneath, arcuate; base rounded; petiole .2-.5 in. long. *Flowers* heads puberulous. *Female heads* in pairs on stout peduncles. *Fruit* glaucous, green, velvety, the size of a cherry; achenes protruding.

K. & J. HILLS (4,000 ft.).

The spines are said to be poisonous.

Fr. 1.

4. *BALANOSTREBLUS* Kurz.

***Balanostreblus ilicifolia* Kurz.**

A spinous shrub, about 15' in height, often gregarious in patches; sap watery; branchlets divaricate, glabrous. *Leaves* 1.5-4 by .5-2 in., oblong or elliptic-oblong, acuminate, spinescent-dentate, rigidly coriaceous, glabrous, green above, slightly paler beneath; midrib impressed above, prominent beneath; lateral nerves 8-10 on either half; nerves laxly reticulate; base shortly cuneate; petiole .1-.2 in. long, transversely verrucose; stipules triangular, caducous. *Male flowers* in cylindric catkin-like spikes. *Female flowers* in pendent racemes (about 1.2 in. long); rachis stout, puberulous; bracts minute; pedicels .1-.12 in. long, hispid; perianth about .17 in. long; base connate with ovary; ovary fleshy, glabrous;

style .04 in. long. *Fruit* a globose drupe, enclosed in the fleshy perianth.

LUSHAI HILLS (U. N. Kanjilal's No. 4757).

Flrs. 3.

5. CONOCEPHALUS Blume.

Conocephalus suaveolens Bl. Vern. *Khung-khai*, Tipp.; *Gabang-lota*, *Lata-dimeru*, Ass.; *Dudiblok*, Garo; *Agig-riube*, Mik.

A large ever-green climber; stem woody. *Bark* darkish-grey with white patches, 1 in. thick; blaze reddish, turning brown; wood cream coloured. *Leaves* alternate, 3-10.5 by 2.5 in., elliptic, ovate-oblong or ovate-elliptic, acuminate, entire, sub-coriaceous, glabrous, sometimes puberulous beneath; cystoliths dotted above and as raised lines beneath; lateral nerves 8-12 on either half, parallel, more conspicuous beneath; base usually rounded; petiole 1.6-5 in. long; stipules large, deciduous, brownish. *Flowers* fragrant, diœcious, in axillary usually cymose dense globose heads. *Male flowers* heads .25 in. across, peduncled, in dichotomous cymes; flowers sessile; perianth segments 4, obovate, spathulate; stamens 3-4; pistillode small. *Female flowers* pedicelled; heads 1 in. across, usually 4-6, in short cymes; perianth tubular, 4-cleft; ovary included; style undivided, short; ovule erect, orthotropous. *Seeds* erect; testa membranous; embryo straight; cotyledons equal; radicle superior.

N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, DARRANG, GOALPARA, KAMRUP, GARO HILLS, K. & J. HILLS, NAGA HILLS & LUSHAI HILLS (upto 4,000 ft.).

Leaves are eaten, cooked.

Flrs. 1-3. Fr. 3-4.

6. MORUS Linn.

Trees or shrubs. *Leaves* alternate, entire, toothed or lobed; base 3-5 nerved; stipules small, caducous. *Flowers* monœcious or diœcious, spicate; tepals 3-4, imbricate. *Male spikes* catkin-like; stamens inflexed in bud; pistillode

turbinate. *Female spikes* long or sub-globose; tepals accrescent in fruit, more or less fleshy and swollen enclosing the achene, confluent into a syncarp. *Ovary* 1-celled, straight: style 2-partite; ovule pendulous. *Seed* sub-globose; albumen fleshy; embryo incurved; cotyledons oblong, equal; radicle incumbent, ascending.

Spikes short, usually less than 2 in. long :—

Leaves caudate-acuminate :—

Tepals 4; 2 inner flat; outer more or less keeled :—

Style connate high up :—

Fruit blackish. .. 1. *M. indica*.

Leaves shortly acuminate :—

Tepals 3 or 4; hyaline, equal, oblong :—

Style connate below :—

Fruit purple. .. 2. *M. serrata*.

Spikes 2.5 in. long :—

Style papillose, bifurcate from near the base :—

Fruit yellowish, insipid, sweetish. .. 3. *M. laevigata*.

1. *Morus acidosa* Griff. Syn. *Morus indica* Linn. Vern. *Kiskuri*, Kamrup; *Bomphang-rakhep*, Mech; *Nuni* Ass.; *Sohlong-dykhur*, Khasi.

A moderate-sized deciduous tree, occasionally a shrub. *Bark* brownish; blaze whitish, exuding copious milky latex. *Leaves* 1.5 by 7.2.5 in., ovate, caudate-acuminate, sharply serrate, obtuse, lobed, membranous, scaberulous (pubescent when young); base 3-nerved, truncate, rounded or cordate; petiole .5-1.5 in. long. *Flowers* appear with young leaves. *Male spikes* .5-1.5 in. long, laxly flowered, hairy; tepals elliptic. *Female spikes* .2.5 in. long; tepals 4, obovate; styles long, hairy, connate below. *Fruit* ovoid or sub-globose, ultimately blackish.

GOALPARA, KAMRUP, SIBSAGAR and K. & J. HILLS.

Often cultivated for the leaves to rear silk worms.

Wood yellowish, hard, weight 45 lbs. per c. ft. Ripe fruit is eaten.

Flrs. 2-5. Fr. 4-7.

2. *Morus serrata* Roxb. Vern. *Dieng-soh-tungkhar*, Khasi.

A large deciduous tree. *Branches* lenticellate; young shoots pubescent; bark brownish. *Leaves* 2-8 by 1·5-6 in., broadly ovate, toothed or serrate, often variously lobed, shortly acuminate, membranous, glabrous or slightly pubescent above, thickly tomentose beneath; base; cordate, 3-nerved; petiole 1-1·7 in. long, tomentose. *Flowers* diœcious; male spikes 1-2 in. and female spikes ·5-·7 in. long. *Style* very hairy, connate below. *Fruit* ·7-1 in. long, mucilaginous, purple.

Cultivated in K. & J. HILLS.

Heart wood yellow or brown, moderately hard, weight about 35 lbs. per c. ft. It seasons well and takes a fine polish and is used for agricultural implements and cabinet work.

The fruits are sweet and are edible. The leaves are cattle fodder and silk worms are also reared on them.

Flrs. 3-5. Fr. 6-9.

3. *Morus lævigata* Wall. Vern. *Anum-asing*, Miri; *Ayum-asing*, Abor; *Bola*, Ass.; *Anga-taya-changne*, Duff.; *Pong-ray-baphang*, Kach.; *Dieng-bylliet*, Khasi; *Boula*, Mech; *Rokseng*, Garo; *Pantha-thing*, Kuki; *Dieng-tieng-lyer*, Synt.; *Repsing*, Rabha.

A large tree (90'/120''); young parts softly hairy; branches covered with horizontal lenticels. *Bark* of young trees brownish grey, but of mature trees rough, dark-brown, splitting in square flakes; inside whitish but coarsely mottled to connective layers of brown; latex milky, copious. *Leaves* 3-8 by 2·5-5 in. ovate, finely serrate or serrulate, membranous, harsh and scaberulous above, glabrous beneath; lateral nerves 5-8 on either half; base 3-nerved, cordate, truncate or rounded, often oblique; petiole ·5-1·5 in. long; stipules softly hairy. *Spikes* elongated, 3-5 in. long, drooping. *Male spikes* hairy, flowers sessile; tepals hairy. *Female spikes* almost glabrous; tepals 2, outer keeled, inner flat; style papillose bifurcate from near the base. *Fruit* yellowish, insipid, 3-6 by ·3 in., in cylindric syncarps.

Common throughout the Province.

Wood hard, even grained, seasons well and takes a fine polish; medullary rays fine, uniform. A most valuable timber in the Province and is the best furniture wood; compares well with teak. Milky juice is used as a plaster for sores.

Flrs. 2-3. Fr. 4-5.

7. BROUSSONETIA Vent.

Broussonetia papyrifera Vent.

A fast growing middle-sized deciduous tree. *Bark* greyish-smooth; young parts pubescent. *Leaves* alternate, some opposite, 3-9 by 2-6 in., very variable, obovate or ovate-acuminate, lobed or not, crenate, dentate, rather membranous, scabrid above, tomentose beneath; base 3-nerved, sometimes oblique, cordate or rounded; petiole 1·5-4 in. long; stipules lateral, lanceolate, about ·8 in. long, caducous. *Flowers* diœcious, axillary. *Male flowers* yellowish, spicate; perianth 4-fid; segments valvate; stamens 4, inflexed in bud. *Female flowers* reddish in globose pedunculate heads; perianth ovoid, 2-4 lobed; bracts clavate; style filiform, pinkish; ovary stalked; ovules pendulous. *Fruit* a head of achenes, reddish when ripe.

KHASI HILLS (probably introduced).

Wood very soft and light. Bark yields a fine fibre which is manufactured into paper in Japan.

Flrs. Hot season. Fr. Rainy season.

8. ALLÆANTHUS Thwaites.

Allæanthus Kurzii Hk. f.

A large deciduous climber, glabrous; young shoots minutely pubescent. *Leaves* 3-5 by 1-2 in., oblong or ovate-oblong, acuminate, denetate, subcoriaceous, glabrous; lateral nerves 6-8 on either half; base rounded or truncate; petiole ·2-·5 in. long; stipules deciduous. *Flowers* diœcious. *Male flowers* in pedunculate fascicled spikes; sepals 4; bracteoles 3-4, hyaline, supporting each flower. *Female flowers* in globose heads (4-6), usually racemose, minutely pubescent; perianth lanceolate; perianth and bracteole confluent into a fleshy mass in which the ovaries are imbedded (Brandis);

style long; stigma filiform. *Syncarps* fleshy, .3 in. across. *Seeds* ellipsoid, .16 in. long, exalbuminous; embryo curved; cotyledons folded; radicle incumbent.

SIBSAGAR (U. N. Kanjilal), GOALPARA (C. B. Clarke).

9. PSEUDOSTREBLUS Bureau.

Pseudostreblus indica Bureau. Vern. *Dieng-lundum*, Khasi; *Dudh-chapa*, Cach.; *Dieng-ka-chiri-khlaw*, Synt.

A handsome middle size evergreen tree, with milky juice. *Bark* whitish or greenish-grey, with scatterel warts; inside dull-white, soon turning greenish black, with strong fibrous layers, .16-.2 in. thick; milky sap turns black. *Leaves* bifarious, alternate, 2-7 by 1-2 in., narrow, elliptic, acuminate, coriaceous, glabrous, dark-green above, paler beneath; lateral nerves 10-20 (with many intermediate ones) on either half, straight and parallel, ultimately forming several loops of intramarginal nerves; base acute; petiole .2-.5 in. long; stipules ovate lanceolate. *Flowers* monocious, axillary. *Male flowers* in cymes. *Female flowers* solitary or mixed with the male; sepals 4, orbicular, concave, accrescent, enclosing the fruit. *Fruit* 1-celled, about .3 in. in across. *Seeds* white.

CACHAR & KHASI HILLS (upto 5,000 ft.).

Fruit edible. Wood cream coloured, with slight yellowish tinge, hard, close-grained, takes a very fine polish. This timber deserves attention in Surma Valley.

Flrs. 6-8. Fr. Cold season.

10. STREBLUS Lour.

Streblus asper Lour. Vern. *Kharanchi-bol*. Garo; *Khorua*, Ass.; *Chir-jhetso*, Mik.; *Scora*, Mech; *Dieng-soh-khyrdang*, Khasi; *Sherphang*, Kach.

A small rigid evergreen tree, with milky juice, often gnarled. *Bark* greyish-white, warty and wrinkled, .16 in. thick, green below the cuticle; blaze cream coloured, turning dirty brown, ultimately blackish. *Leaves* alternate, 1-4 by .8-1.5 in., elliptic, rhomboid or obovate, acute. obtuse or abruptly and shortly acuminate, more or less serrate or irregularly toothed, coriaceous, scabrid; lateral nerves 4-6 on

either half, more conspicuous beneath, joined by intra-marginal loops; base cuneate; petiole .05-.2 in. long, pubescent; stipules lanceolate, acuminate. *Flowers* generally diœcious, axillary. *Male flowers* in globose pedunculate heads; perianth campanulate; sepals 4, imbricate; stamens 4, inflexed in bud head sometimes androgynous, (U. N. Kanjilal). *Female flowers* solitary, pedunculate; perianth embracing the ovary; sepals 4, enlarged in fruit; style filiform. *Berry* 1-seeded, globose, .2 in. across, yellow when ripe.

Common throughout the Province.

Wood moderately hard (40 lbs. per c. ft.) used in making yokes. The fruit is edible when ripe. The twigs are used for cleaning the teeth. Leaves are used to polish wood and the milky juice is medicinal.

Flrs. 2-4. Fr. 5-7.

11. TAXOTROPHIS Blume.

***Taxotrophis caudata* Hutchinson.** Burm. II (464). For Fl. Brit. Syn. T. zeylanica Hook f. F.B.I. V. P. 488 partim; Kurz.

A small thorny tree, 20-25 feet high, with milky juice; young branchlets puberulous. *Leaves* 2-7 by .8-1.6 in., somewhat elongate-ovate or oblong-elliptic, crenate-serrate towards the apex and entire towards the base, chartaceous, glabrous; nerves more conspicuous below; lateral nerves 7-10 on either half, arcuate; base rounded; petiole .1-.2 in. long, terete; stipules connate, lanceolate. *Male inflorescence* short, puberulous; perianth-segments ovate, obtuse; anthers primarily much inflexed, ultimately erect; filaments glabrous, slender; pistillode rudimentary, glabrous, conical. *Female inflorescence* axillary, 3-4 flowered; pedicel .2 in. long, (.6 in. long, in fruit); perianth-segments 4, sub-acute, glabrous, somewhat accrescent. *Ovary* somewhat oblique, style thick; arms hispid. *Fruit* globose, black, about .25 in. across.

NOWGONG—Lumding, Nov. 10, 1913. (Kanjilal's No. 2904).

Flrs. 9. Fr. 10-11.

FAM. 125(a). CANNABINACEÆ.

(Engler. in Engl. U. Prantl.)

(Urticaceæ Tribe III Cannabinæ Gen. Plant.)

Shrubs or herbs, sometimes climbing, without milky juice, often secreting aromatic resin. *Leaves* palmately nerv-ed; stipules free, persistent. *Flowers* diœcious; male flowers in cymes; sepals 5, imbricate; filaments straight in bud; pistillode 0; female flowers in compact cymes or heads, bracteate; perianth entire, reduced. *Ovary* of 2 carpels 1-celled; stigma 2, large, feathery; ovule solitary, pendulous, anatropous. *Fruit* an achene; embryo curved or spiral; albumen present or absent.

***Cannabis sativa* Linn.** Vern. *Bhang, Jangli-bhang*, Ass.

A strong smelling annual of very variable height. *Leaves* 3-8 in. long, palmately-partite; lobes narrow-lanceo-late, serrate. *Flowers* greenish.

Common throughout ASSAM.

It is the source of *ganja*, *charas* and *bhang*. *Ganja* consists of the dried resinous flowering shoots of specially cultivated female plants by exclusion of male plants, so that the flowers may not be fertilized. *Charas* is the natural exudation from the various parts of the plants which is produced in plants growing in cold climate (Katamunda, Yarkand, etc.). It is largely imported and contains a large propor-tion of the active principle and is more narcotic. *Bhang* consists of the dried leaves and flowering shoots from plants growing wild.

The bast fibre yields the true *Hemp*. Official in the Indian as well as British Pharmacopœas.

Flrs. & Fr. Cold season.

***Humulus Lupulus* Linn.** The Hop—largely cultivated.

A perennial twining scabrid herb. It is officinal in India and British Pharmacopœas.

The fruit is used in brewing.

FAM. 126. URTICACEÆ.

Herbs or undershrubs, rarely shrubs or trees, without latex, sometimes furnished with stinging hairs. *Leaves* opposite, alternate, often bifarious, with 3 basal nerves and opaque dots due to the presence of cystoliths; stipules membranous, sometimes interpetiolar. *Flowers* small greenish, 1-sexual, in cymose inflorescence, often condensed into pseudo heads. *Male flowers* perianth 4-5, free or united, sepaloid, infrequently 2-3 merous; stamens as many and opposite to the perianth lobes, incurved in bud, exploding when ripe; anthers 2-celled, with broad connective, dorsifixed; pollen spherical; pistillode usually present. *Female flowers* perianth gamophyllous, 4-5-lobed, sometimes accrescent and fleshy in fruit. *Ovary* superior, 1-celled; ovule 1, basal, orthotropous. *Fruit* a drupe or utricle, often united to the perianth. *Seed* usually with rich oily albumen; testa membranous; embryo straight.

“ Bast-fibres strongly developed in the bark, often very long.”
(Brandis).

Hairs stinging (at least those on inflorescence) :—

Flowers cymose :—

Leaves alternate :—

Female perianth 4-phyllous or deeply 4-lobed; ovary oblique :—

Stigma ovate or linear, hooked, sometimes appendaged at base:—

Herb. 1. **Fleurya.**

Stigma linear, papillose on one side :—

Shrubs or trees. 2. **Laportea.**

Female perianth tubular. 2-3-toothed;
ovary straight.

3. Girardinia.

Hairs not stinging :—

Female tepals 3, rarely 4, very small and unequal, sometimes hooded or gibbous :—

Stigma penicellate:—

Leaves opposite 4. Pilea.

Female tepals 2-4, very minute or obsolete :—

Stigma penicillate :—

Leaves alternate. 5. *Elatostema*.

Hairs not stinging :—

Female perianth tubular, ovoid or campanulate :—

Fruiting perianth dry :—

Stigma persistent. 6. *Bœhmeria*.

Stigma deciduous. 7. *Pouzolzia*.

Fruiting perianth more or less succulent :—

Ovary free. Leaves narrow; stigma penicillate :—

Perianth obliquely campanulate. 8. *Sarcochlamys*.

Ovary adnate. Leaves broad :—

Perianth ovoid :—

Stigma sessile, sub-peltate, ciliate :—

Leaves green beneath. .. 9. *Oreocnide*.

Stigma penicillate :—

Leaves white or grey beneath. 10. *Debregeasia*.

Female perianth 0 :—

Young shoots silky :—

Leaves white felted beneath. .. 11. *Maoutia*.

URTICA Linn.

***Urtica parviflora* Roxb.**

A slender perennial (root) herb; branches angled. *Leaves* variable, 2-4 by 1.5-3 in., ovate-cordate, acuminate, doubly crenate or serrate, membranous, covered with copious stiff stinging hairs; petiole upto 2.5 in. long; stipules connate. *Flowers* monœcious, in short peduncled cymes forming an erect terminal panicle. *Male* and fruiting sepals hispid.

NAGA HILLS (Kohima).

Flrs. and young fruits 2.

1. FLEURYA Gand.

***Fleurya interrupta* Gaud.**

A nettle-like erect herb, with stinging hairs. *Leaves* with linear cystoliths, alternate, 5-6 in. long, ovate, acuminate, coarsely toothed with bulbous based hair above, glabrous beneath except on the nerves; base 3-nerved; subcordate, truncate or cuneate; petioles longer than the blade; stipules

2-fid. *Cymes* 6-14 in. long, lax; branchlets and pedicels recurved. *Male* and *female* on the same clusters. *Male* 4-5-merous. *Female* perianth cupular, 4-lobed. *Ovary* oblique. *Achene* oblique. *Seeds* nearly exalbuminous.

KHASI HILLS (Griffith).

Flrs. & Fr. Autumn.

2. LAPORTEA Gaud.

Trees, shrubs or herbs with (sometimes very minute) stinging hairs. *Leaves* alternate, entire or toothed, palmi-nerved or penninerved; stipules free or connate. *Flowers* monœcious or diœcious, in paniculate usually unisexual cymes or racemes; upper cymes usually very long and male flowers and fruits often reflexed. *Male flowers*-tepals 4-5, sub-valvate; stamens 4-5, reflexed in bud; pistillode clavate or sub-globose. *Female flowers* perianth segments 4, sub-equal or outer small, sometimes absent. *Ovary* at length oblique; style linear, papillose on one side. *Achene* oblique, compressed or flattened, membranous or fleshy, seated on the perianth, sometimes obliquely stipitate. *Seed* sub-exalbuminous; cotyledons broad.

A herbaceous stemmed shrub.

.. 1. *L. crenulata*.

A tree.

.. 2. *L. pterostigma*.

1. *Laportea crenulata* Gaud. Vern. *Khoma* or *Phoma*, Mech; *Gilmat-jakma*, Garo; *Germa-yung*, N. Cach.; *Dieng syn-rem*, Khasi; *Phaji*, Miri; *Paji*, Abor.; *Kerma-phang* Kach.; *Tarmepi-arong*, *Bap-kangsan*, Mik.; *Thlak-pui*, Lushai; *Laua-chutra*, Sylh.; *Thakpui-kung*, Tip.; *Torash, sorot-gach*, Ass.

A herbaceous stemmed shrub; young parts clothed with stinging hairs. *Leaves* 6-14 by 3-5 in., ovate or elliptic, more or less entire, sometimes crenulate towards the apex, acute or acuminate, clothed with stinging hairs, penninerved; base rounded or cordate; petiole stout, 1-4 in. long. *Urticle* inflated, white.

Throughout the Province (upto 4,000 ft.).

The sting of the nettle is very virulent.

Flrs. 8-10. Fr. Cold season.

2. *Laportea pterostigma* Wedd. Vern. *Paji-asing*. Miri; *Paso-gilong*, Abor.; *Tarme*, Mik.; *Phepha-soroth*. Ass.; *Son-rem*, Khasi.

A large tree (60'/120"). *Bark* whitish with vertical lines of lenticels and distant horizontal wrinkles; stem buttressed at base; bark .7 in. thick, very soft, white inside; wood very soft. *Leaves* 8-12 by 6.5-8 in., ovate or broadly-elliptic, more or less entire, acute or somewhat acuminate, subcoriaceous, palminerved; base rounded or truncate; petiole 6-8 in. long, stout.

N. E. F. TRACT.

Flrs. and Young fruit 2.

***L. terminalis* Wight.** is also reported from NAGA HILLS (Kohima).

3. *GIRARDINIA* Gaud.

***Girardinia heterophylla* Dcne.** Vern. *Taintham*, *Ting-thap*, Khasi; *Paji-jimang*, Miri and Abor.; *Ing-geo*, Kach.

A tall stout coarse soft stemmed undershrub, armed with numerous slender stinging hairs. *Leaves* 4-8 by 2.5-4 in., or as long as broad, lobed, coarsely dentate or serrate, membranous, pubescent, 3-nerved; base cordate; petiole .8-3 in. long; stipules intrapetiolar, connate, foliaceous, membranous. *Male flowers* 4merous, in short axillary spikes; tepals valvate; filaments persistent; pistillode globose. *Female flowers* in compact capitate panicles; perianth tubular, ventricose, 2-3-toothed, ultimately splitting, spathaceous. *Achene* broad, compressed, .15 in. across; testa membranous; albumen scanty; cotyledons broad.

N. E. F. TRACT, N. C. HILLS, MIKIR HILLS (Sibsagar) and K. & J. HILLS (5,500 ft.).

Flrs. 9. Fr. 11.

***G. zeylanica* Dcne.** is also recorded from NAGA HILLS (Kohima).

Flrs. 8.

4. *PILEA* Lindl.

***Pilea smilacifolia* Wedd.**

A stout undershrub, woody below; stem angled; diœcious. *Leaves* opposite, 4-8 by 1.3-2.2 in., elliptic-

lanceolate, entire, acuminate, membranous, glabrous; base, 3-nerved, the 2 basal nerves converging nearly to the apex; narrowed into the petiole (1-3 in. long); stipules intrapetio-
lar, persistent. *Cymes* variable, shortly peduncled, often in pairs. *Male flowers* minute; sepal 2-4, free or connate, cupular; stamens 2-4; pistillode conical or oblong. *Female flowers* tepals 3 rarely 4. *Ovary* straight; stigma sessile, penicellate. *Achene* ovoid, compressed, .05 in. long. *Seeds* erect; testa thin; albumen very scanty; cotyledons broad.

SIBSAGAR.

Flrs. 4. Fr. Rainy season.

P. umbrosa Wedd.

Herbaceous, more or less pubescent. *Leaves* broadly elliptic, ovate, more often acuminate, crenate-dentate, 3-nerved at base; base oblique, rounded or shallow cordate; petiole .1-2 in. long. *Cymes* various; peduncles 2-3 in. long. *Male flowers* small; perianth without spur. *Female* perianth largest. *Achenes* .03 in. across minute, flattened, often with raised intra-marginal ridge.

KHASI HILLS 4-6,000 ft.

Flrs. 8. Fr. 9-10.

The following herbaceous species are also recorded from the region of the flora :—*P. anisophylla* Wedd., *P. insolens* Wedd., *P. lancifolia* Hk. f., *P. peploides* Hk. f. & Arn., *P. scripta* Wedd., *P. Hookeriana* Wedd., *P. pachycarpa* Wedd., *P. obliqua* Hk. f., and *P. thalactrifolia* C.B.C.

Lecanthus Wightii Wedd.

A small succulent herb. *Leaves* opposite, 2-2.5 by .5-1 in., ovate, somewhat oblique, acute or shortly acuminate, dentate, membranous, glabrous; base 3-nerved; petiole upto 2.5 in. long. *Flowers* heads long peduncled (upto 5 in. long—local specimen). *Receptacle* .4 in. across. *Achene* much compressed, ovoid.

KHASI HILLS, NAGA HILLS & MANIPUR.

5. ELATOSTEMA Forst.

Herbs or undershrubs. *Leaves* alternate or sometimes with a minute leaf sub-opposite to the normal leaf, distichous, sessile or sub-sessile, usually very oblique and inequilateral, 3-nerved from the base or shortly above it;

stipules lateral or intrapetiolar. *Flowers* very minute, monœcious or diœcious, crowded on sessile or peduncled unisexual usually involucrate receptacles; bracts rounded, oblong or ovate, outer at times with a dorsal spur or horn, base nearly free or more or less confluent in a fleshy circular or lobed disk, the tips projecting from its margin, entire; bracteoles densely crowded, oblong in males, spatulate in females. *Flowers* often clustered in the heads, each cluster surrounded by a partial bracts and the head is then lobulate. *Male flowers* sepal 4-5; 2 or more, usually tubercled or spurred on the back; stamens 4-5, inflexed in bud; pistillode minute. *Female flowers* sepals 3-5, very minute, much shorter than the ovary, persistent; staminodes minute or 0. *Ovary* straight; ovule erect; stigma penicillate. *Fruit* a minute ellipsoid or fusiform usually ribbed achene subtended by the minute perianth. *Seeds* exalbuminous; testa membranous; cotyledons ovate or semi-cylindric.

Elatostema sessile *Forst.* Vern. *Ja-u-e*, Khasi.

Shrubby, usually pubescent, 6-8 ft. high; stem woody, hollow, often climbing. *Bark* blackish-green. *Leaves* 3-7 by 1-1.5 in., oblanceolate, greenish, coarsely serrate, acuminate, membranous, glabrescent above, pubescent on the nerves beneath; petiole 0.1 in. long.

K. & J. HILLS (4,500 ft.).

Flrs. 4.

E. rupestre *Wedd.* Shrubby, stout, rigid, 6-10 ft. high. *Leaves* 3-6 by 1.3-2.5 in., elliptic, elliptic-lanceolate or broadly elliptic, acute or acuminate, serrate, coriaceous; petiole 1.5 in. long, cystoliths crowded.

K. & J. HILLS (4,500 ft.).

Flrs. 3.

E. sesquifolium *Hassk.* A branching undershrub; lower parts woody. *Leaves* 3-10 by 1.2-2 in., oblong-elliptic or elliptic-lanceolate, quite entire, caudate-acuminate, coriaceous; petiole 2.1 in. long. *Male-receptacle* sessile or sub-sessile.

K. & J. HILLS.

Flrs. 3-4. Fr. 6-7.

E. lineolatum *Wight.* An undershrub or herbaceous perennial. *Leaves* 1.5 by 5.1-5 in., oblong, oblong-lanceolate, elliptic-

obovate, entire or coarsely crenate or serrate above the middle. acuminate; petiole 0·1 in. long. *Receptacle* sessile.

K. & J. HILLS.

Flrs. 5. Fr. 7.

E. platyphylla Wedd.

A stout tall undershrub. *Leaves* 6-7 by 1·5-2 in., (Local specimen) oblique, elliptic-lanceolate, caudate-acuminate, (acumen upto 3 in.) sub-coriaceous, serrulate, scaberulous above, glabrescent beneath (cystolith crowded); base, oblique cuneate; lateral nerves 4-5. on either side (2 from near the base); petiole ·5 in. long; stipule about ·8 in. long. *Male receptacle* lobed. *Female flowers* ·3 in. across, somewhat pubescent. *Achenes* ovoid.

KHASI HILLS & NAGA HILLS (upto 6,000 ft.).

Flrs. & Fr. 2 and later.

The following species of *Elatostema* are also recorded from the region of this "Flora." :—

E. ficoides Wedd., *E. molle* Wedd., *E. acuminatum* Brong., *E. Stracheyanum* Wedd., *E. Hookerianum* Wedd., *E. dissectum* Wedd., *E. Griffithii* Hk. f., *E. papillosum* Wedd., *E. Clarkei* Hk. f., *E. procrioides* Wedd., *E. decipiens* Wedd., *E. surculosum* Wight., *E. obtusum* Wedd. and *E. cornutum* Wedd.

Procris Wightiana Wall.=*Procris lævigata* Blume. Vern. *Ja-lei-wah*, Khasi.

A herbaceous epiphytic undershrub. *Leaves* (minute leaves also occur alternate or sub-opposite to the normal leaves) 5-8 by 1·1-5 in. long, lanceolate or oblanceolate, acuminate, entire or distantly crenate towards the apex, membranous, glabrous, green above, pale-grey beneath; lateral nerves 7-11 on either half, slender; base oblique, unequal sided, narrowed into the petiole, (·2-·4 in. long). *Male flowers* 4-5 merous, in small scanty axillary cluster; pistillode purplish. *Females* on a receptacle; sepals 3-5; staminode 0; stigma penicellate. *Achene* ovoid, slightly compressed.

K. & J. HILLS, MISHMI HILLS (Griffth.) & MANIPUR (Clarke) upto 4,000 ft.

Flrs. Rainy season. Fr. Cold season.

6. BŒHMERIA Jacq.

Shrubs or small trees. *Leaves* opposite or alternate, toothed, palmately 3-nerved; stipules usually free, deciduous. *Flowers* unisexual, in clusters which are axillary or arranged in interrupted axillary spikes, racemes or panicles; bracts small, scarious. *Male flowers*-perianth 3-5-lobed or partite,

valvate; stamens 3-5, inflexed in bud; pistillode clavate or globose. *Female flowers* perianth tubular, 2-4-toothed, sometimes angled, winged or ventricose in fruit. *Ovary* included; ovule erect; stigma filiform, persistent. *Achene* crustaceous, closely invested by the perianth, at length free and dry; testa thinly membranous. *Seeds* albuminous; cotyledons ovate.

Flowers in clusters :—

Leaves all alternate, glabrous above, pubescent beneath :—

Achene ovoid :—

A small tree or shrub. 1. *B. malabarica*.

Leaves alternate or sometimes opposite, usually hispid on both surfaces :—

Achene oblong-compressed :—

A slender diffuse undershrub. .. 2. *B. sidæfolia*.

Flowers-clusters arranged in simple or paniced spikes :—

Leaves alternate :—

A shrub with herbaceous branches :—

Leaves scabrid above, snow-white beneath except the nerves. .. 3. *B. nivea*.

Leaves usually opposite; petioles unequal in 1 pair :—

Leaves narrowly lanceolate, coriaceous; petiole 3-3 in. long. 4. *B. macrophylla*.

Leaves broadly elliptic or ovate, rather membranous, sometimes alternate or ovate-cordate; petiole 1.5-5 in. long. 5. *B. platyphylla*.

Leaves lanceolate, membranous, opposite, lanceolate or oblong-lanceolate; petiole 3-2.5 in. long :—

Achene glabrous. 6. *B. Hamiltoniana*.

Leaves broadly ovate, coriaceous, sometimes alternate or ovate-cordate; petiole 2-5 in. long :—

Achene hispid. 7. *B. polystachya*.

1. *Bœhmeria malabarica* Wedd. Vern. *Dieng-thyn-rajit*, *Dieng-soh-khar*, Khasi; *Sam-khul-khra*, *Borthur-thuri*, Garo; *Banchak-arong*, Mik.; *Tan-ngam*, *Maurashabaphang*, Kach.; *Sukhrup*, Tipp.

An erect shrub or a small tree; branches spreading. *Bark* greyish, rough, thin. *Leaves* alternate, 2-8 by 1.5 in., sub-equal or alternately large and small, ovate, ovate-

lanceolate or elliptic-lanceolate, crenate or serrulate, acuminate, membranous, glabrous above, pubescent beneath; strongly 3-nerved; base sub-acute, rounded or shallow-cordate; petiole .3-4 in. long; stipules small, deciduous. *Flowers* greenish-white in axillary sessile clusters, .16-.25 in. across. *Male flowers* perianth 4 partite, stamens 4; pistillode small, sub-globose. *Female flowers* perianth 4-toothed, pubescent. *Achene* minute, ovoid, closely invested by the perianth.

SIBSAGAR, NOWGONG, N. E. F. TRACT & K. HILLS.

Fairly common throughout the Province.

Cattle fodder.

Flrs. Cold season. Fr. 1-3.

2. *Bœhmeria sidæfolia* Wedd.

A slender diffuse undershrub; young parts hispid. *Leaves* opposite and alternate 1-4.5 by .6-1.7 in., ovate-lanceolate or elliptic, sharply serrulate, acuminate, membranous, hispid on both sides; base obtuse or rounded; petiole .2-1 in. long. *Flowers* clusters hispid, often on naked branchlets terminated by a tuft of leaves. *Achene* oblong, compressed, hispid.

N. C. HILLS, GARO HILLS, K. & J. HILLS (cpto 4,000 ft.) & MISHMI HILLS (Griffith).

Flrs. & Fr. Cold season.

3. *Bœhmeria nivea* Hook. et Arn. The Rhea plant Vern. *Riha*, Ass.

A shrub with herbaceous branches, tomentose. *Leaves* 2-6 by 1.5-4 in., broadly ovate or suborbicular, acuminate, dentate, sub-coriaceous, scabrid above, white beneath (except the nerves), densely matted with adpressed hairs; 3-nerved; secondary nerves to the midrib 3-4 on either half towards the apex; base cuneate or rounded; petiole .6-3.5 in. long; stipules subulate, deciduous. *Flowers* greenish, monœcious, in axillary unisexual paniced clusters. *Female flowers* perianth—upper; style exserted, hairy. *Achene* oblong compressed hairy.

It is indigenous and cultivated in CHINA and JAPAN.

Cultivated in ASSAM for the fibre, which is obtained from the inner

bark and is perhaps the longest and most silky of all vegetable fibres. Great skill is required for preparing the fibre (often running wild).

Flrs. & Fr. Cold season.

4. ***Bœhmeria macrophylla* Don.** Vern. *Dieng-soh-khasim*, *Dieng-soh-khva*, Khasi.

A small tree or a large shrub. *Bark* dark-brown; branchlets 4-angled; young parts strigose. *Leaves* opposite, 4-12 by 1-3 in., narrow lanceolate, caudate acuminate, serrulate, glabrescent or pustular and rugose above, paler underneath and thinly strigose on the nerves; the basal nerves converging nearly to the apex; base obtuse or rounded; petiole .3-3 in. long, strigose; stipules narrow-lanceolate, about .5 in. long, caducous. *Flowers* monœcious in dense clusters (.18-.25 in. in across), arranged in drooping spikes about as long as the leaves. *Male flowers* perianth 4-lobed; stamens 4; pistillode rudimentary. *Female flowers* perianth 2-4-toothed, persistent; style laterally stigmatose. *Achene* closely invested by the perianth; fruiting perianth obovate, cuneate, suddenly constricted upwards to the 2-4-toothed neck.

KAMRUP & K. & J. HILLS (4500 ft.).

Flrs. 8-9. Fr. Cold season.

***B. macrophylla* Var. *Listeri* Gage.** Leaves smaller, 2-6 in. long; spikes densely fascicled in the axils.

DARRANG.

Flrs. & Fr. Cold season.

5. ***Bœhmeria platyphylla* Don.** Vern. *Yampi-yammi-asing*, Miri; *Labit-iong*, Khasi.

A variable large spreading shrub; branches succulent, more or less strigose. *Bark* blackish; contains a pith-like substance inside. *Leaves* opposite, sometimes alternate, 2-6 by 1-2-4 in., broadly ovate, ovate-elliptic or suborbicular, acuminate, coarsely toothed, rather membranous, more or less scaberulous, 3-nerved; base rounded or cordate, often oblique; petiole 1-5-5 in. long. *Flowers* whitish, monœcious (sometimes diœcious). *Male spikes* usually branching from the lower axils. *Female* spikes from the upper axils, much

exceeding the leaves (type), pendulous. *Fruiting perianth* ellipsoid, sometimes angled.

LAKHIMPUR and K. & J. HILLS (4,000 ft.).

An exceedingly variable plant split up into many varieties in (F.B.I., V., 578).

Flrs. 6-8. Fr. Cold season to hot season.

B. platyphylla Don. Var. *tomentosa* Wedd.=*B. tomentosa* Wedd. is recorded from K. & J. Hills.

6. Bœhmeria Hamiltoniana Wedd. Vern. *Soh-byrthied-kyrteng*, *Soh-synthap*, Khasi.

An undershrub; branches slender, glabrous. *Leaves* opposite, 4-8 by 1-1.8 in., lanceolate, acuminate, crenulate or serrulate, membranous, glabrous; 3-nerved; axils of the lateral nerves glandular; base acute or obtuse; petiole 3-2.5 in. long. *Flowers* clusters small, in slender spikes. *Achene* minute, ellipsoid, glabrous, crowned by the style nearly as long.

LAKHIMPUR and K. & J. HILLS (3,000 ft.).

Flrs. & Fr. 9-1.

7. Bœhmeria polystachya Wedd.

A robust shrub; branches stout, glabrous. *Leaves* opposite, sometimes alternate, 5-12 by 2.5-6 in., broadly ovate, sub-orbicular, acuminate, coarsely dentate towards the apex, coriaceous, glabrous; 3-nerved; base cordate or rounded; petiole 5-2 in. long, stout. *Spikes* paniced, shorter than the leaves. *Achene* sessile, hispid, crowned by a short style.

MISHMI HILLS & KHASI HILLS (5,000 ft.).

Flrs. 7-8. Fr. 9-10.

B. rugulosa Wedd.

A small tree. *Leaves* 3-6 by 1-2 in., alternate, elliptic or elliptic-lanceolate, acute or bluntly acuminate, crenulate, glabrous, often rugose above, hoary-tomentose (finely) beneath; base rounded, 3-nerved; petiole 7-1.5 in. long; stipules connate. *Diœcious spikes*, axillary, drooping. *Male spikes* up to 5 in. long. *Perianth* hispid, hairy. *Achene* stipitate, ellipsoid.

NAGA HILLS.

Flrs. Rainy season. Fr. Cold season.

Chamabainia cuspidata Wight.

A slender shrub. *Leaves* opposite, 1-1.5 by .3-.9 in., ovate, acute, toothed, membranous, glabrous or very sparsely pubescent; base usually rounded, 3-nerved; petiole .3 in. long; stipules orbicular in pairs. *Flowers* 4-merous; male in the upper axils; perianth lobes hairy, mucronate; female in clusters; perianth hirsute; stigma ovate, fimbriate, spreading. *Achene* compressed.

K. & J. HILLS (Elephant Falls).

Flrs. 8.

7. POUZOLZIA Gauz

Herbs or shrubs. *Leaves* alternate or opposite, 3-nerved; uppermost sometimes passing into bracts. *Flowers* unisexual or androgynous, in axillary clusters. *Male flowers* perianth 4-5, very rarely 3, partite or lobed, dorsally gibbous or abruptly inflexed; pistillode clavate or oblong. *Female flowers* perianth tubular, 2-4-toothed; mouth contracted. *Fruiting perianth* angled or winged; style slender, articulate on the top of the ovary, deciduous. *Achene* crustaceous, albumen scanty or 0; cotyledons ovate.

Lobes of male perianth convex or gibbous dorsally; buds rounded :—

Stamens 4. Leaves alternate. 1. *P. viminea*.

Lobes of male perianth abruptly inflexed about the middle and angled; buds truncate :—

Stamens 5. Leaves opposite. 2. *P. hirta*.

1. Pouzolzia viminea Wedd. Vern. *Misagi-jollaphang*, Kach.; *Khojo*, Rabha.

A large shrub; branches slender, pubescent or strigose. *Bark* brownish-grey, rough, thin. *Leaves* alternate, 1-6.5 by .5-2 in., lanceolate, ovate-lanceolate or oblong-lanceolate, acuminate, dentate or serrate, membranous, dark-green, scaberulous and somewhat rough above, trigose on the nerves and pale grey beneath; 3-nerved; base obtuse or rounded; petiole .2-2.5 in. long. *Stamens* usually 4, inflexed in bud. *Achene* ovoid, angled, sparsely hispid towards the apex.

N. C. HILLS, GOALPARA, KAMRUP and K. & J. HILLS (5,500 ft.).

The leaves are eaten as vegetable and the bark yields a fibre for making coarse ropes.

Flrs. 11-3. Fr. 8-1.

P. viminea Wedd. Var. *fulgens* Wedd. Vern. *Misagidukha*, Kach.

Leaves elegantly veined and snowwhite or paler silky beneath.

N. E. F. TRACT, N. C. HILLS & DARRANG.

P. indica Gaud. Var. *angustifolia* is recorded from NOWGONG (Diphu Forests).

Flrs. 8.

2. **Pouzolzia hirta** Hassk. Vern. *Jamynsleh*, Khasi.

A suberect or decumbent slender perennial almost woody plant with tuberous roots. *Leaves* opposite, .5-4 by .3-1 in., lanceolate or oblanceolate, acuminate, entire, membranous, hispid; usually strongly 3-nerved; base rounded or cordate; petiole 0.2 in. long. *Male flowers* in close clusters, 5-merous, globose, truncate, hairy above. *Fruit* variable, dull black when ripe, apterous or 2-3-alate.

K. & J. HILLS 5,500 ft.

Roots are used as hair wash.

Flrs. 7-10. Fr. Cold season.

P. hirta Hassk. Var. *P. quinquenervis* Benth. Basal nerves usually 5.

K. & J. HILLS (5,000 ft.). G. Mann.

Flrs. 7.

P. Bennettiana Wight.

Herbaceous; stem erect, pubescent. *Leaves* 3-5 by .8-1 in., lanceolate, acuminate, puberulous; base rounded; petiole very short. *Male flowers* almost glabrous, in axillary clusters. *Stamens* 5. *Fruit* costate.

KHASI HILLS (Dumpep) 5,000 ft.

Flrs. & Fr. 6-8.

P. pentandia Benn. is also recorded from KHASI HILLS & NAGA HILLS.

Flrs. 9.

Distemon indicum Wedd.

An erect very slender herb, 2-3 ft., in height, scarcely branched. *Leaves* 2·5-4·5 in., ovate caudate acuminate. *Flowers* in bracteate androgynous clusters. *Male flowers* perianth tubular 2-3-fid, valvate; pistillode woolly. *Female flowers* perianth ovoid tubular 2-toothed; stigma deciduous. *Achene* ·1 in. long, ovoid beaked.

ASSAM (Jenkins).

Flrs. & Fr. 7-10.

8. SARCOCHLAMYS Gaud.

Sarcochlamys pulcherrima Gaud. Vern. *Dienglangshir*, *Dieng-soh-khwa-lali*, Khasi; *Bangri*, *Luthi*, Sylh.; *Sanmari*, Manip.; *Kongloidon*, Tipp.; *Adung-umra*, Mech.; *Mesaki*, Ass.; *Misagi-phang*, Kach.

A small evergreen tree or large shrub; stem tubercled; branchlets pubescent. *Leaves* alternate, 3·5-8 by ·5-2 in., narrow lanceolate, toothed, caudate acuminate, rather membranous, rugose, shining and rough above, white beneath; strongly 3-nerved; basal nerves converging nearly to the apex; reticulations elegant and tessellate; base acute, obtuse or rounded; petiole ·5-3 in. long; stipules connate at base, intrapetiolar. *Flowers* diœcious; male clusters in slender rather interrupted axillary spikes; female clusters almost confluent in stouter spikes. *Male flowers* perianth sepaloid, connate, 5-partite; lobes imbricate; stamens 5; pistillode small. *Female flowers* perianth campanulate, constricted, 4-lobed, gibbous, accrescent in fruit. *Ovary* oblique; ovule erect; stigma small, sessile, penicellate. *Achene* oblique, enclosed in the fleshy perianth; pericarp membranous; testa hard; albumen 0; cotyledons ovate.

Common throughout the Province.

Young shoots and fruits are eaten as vegetables. Lac is also reared on this plant.

Flrs. & Fr. Cold season.

9. OREOCNIDE Miq.

Trees or shrubs. *Leaves* alternate; stipules intra-petiolar. *Flowers* usually diœcious, densely and capitately fascicled; fascicles cymose or paniced; bracts minute. *Male*

flowers perianth 4-5-partite; stamens exserted; pistillode present. *Female flowers* perianth tubular; minutely toothed, adnate to the ovary, somewhat fleshy in fruit; mouth narrowed; ovules erect; stigma sessile, discoid, penicillate. *Achene* crustaceous, closely invested by the perianth; testa thinly membranous; albumen distinct or scanty; cotyledon ovate or broad.

Leaf penninerved :—

Male flowers 3-4-merous. Leaves entire,
somewhat obscurely crenate. 1. *O. integrifolia*.

Leaf-base 3-nerved :—

Male flowers 4-merous. Leaves distinctly
serrate. 2. *O. frutescens*.

1. *Oreocnide integrifolia* Miq. Syn. *Villebrunea integrifolia* Gaud. Vern. *Khilkhra*, Garo; *Tillejuat*, *Dieng-teingbah*, Synt. and Khasi; *Thehoy-arong*, *Inthumabab-arong*, Mik.; *Chho-oi-paroli*, Ass.; *Dieng-jei-thang-sim*, Khasi; *Thing-khra-phang*, *Khem-khratong-baphang*, Kach.; *Ijak-thing*, Kuki; *Bonrhea*, Sib.; *Horhuta*, Sylh.; *Sejugbu*, Lushai.

A small evergreen tree; young parts pubescent or tomentose. *Bark* greyish, warty with lenticels, .16 in. thick; blaze red, exuding water, green, fibrous. *Leaves* 4-14 by 1.5-4.5 in., elliptic-oblong, obovate-oblong, acuminate, usually entire, sometimes obscurely crenate, thinly chartaceous, pustular, sparsely puberulous above, pubescent beneath; lateral nerves 9-12 on either half; base obtuse; petiole .5-4 in. long (local; 1-6 in. in F.B.I.); stipule silky, hairy, deciduous. *Flower heads* dichotomously branched; cymose, hispid. *Male flowers* 3-4-merous; stigma papillose, ciliate; the bracts become succulent and glossy when the fruit ripens & it is seated on the cavity of the cup-shaped bract.

Occurs throughout the Province (4,500 ft.).

Fibres utilised for making fishing nets.

Flrs. 1-3. Fr. 10-11.

2. *Oreocnide frutescens* Miq. Syn. *Villebrunea frutescens* Bl.

A large bushy shrub; bark dark-brownish on old stem;

branches slender, with whitish lenticels; young parts silky pubescent. *Leaves* 1·5 by 3·2 in., ovate or elliptic or oblong-lanceolate, acuminate, finely serrate or crenate, membranous, hispidly hairy and pustulate above, softly pubescent beneath and mottled whitish; 3-nerved at base, penninerved in the upper half; base obtuse, rounded or shallow-cordate; petiole ·3·1·1 in. long; stipules upto ·3 in. long. *Male flowers* perianth 4-partite; lobes valvate, lanceolate, woolly inside; stamens 4; pistillode glabrous. *Female flowers* perianth ovoid; stigma penicellate. *Fruit* aggregate of achenes, ·3 in. across. contained in the somewhat fleshy perianth, orange when ripe, supported by the cup-shaped bract.

N. C. HILLS and K. & J. HILLS (4,500 ft.).

The bark yields a useful fibre.

Flrs. 4-5. Fr. 10-11.

10. DEBREGEASIA Gaud.

Shrubs or trees. *Leaves* alternate, serrate-crenate; 3-nerved at base; stipules intrapetiolar, connate. *Flowers* monœcious or diœcious, in compact paniced or spicate clusters (but not connate). *Male flowers* perianth sepaloïd, 4-partite (rarely 3 or 5) valvate; stamens 4, (rarely 3 or 5); pistillode glabrous or woolly at base. *Female flowers* perianth ovoid or obovoid; mouth contracted and minutely toothed, succulent in fruit. *Ovary* straight, included; ovule erect; stigma sessile, penicellate. *Achene* at first adnate to the fleshy perianth; testa membranous; albumen copious or scanty; cotyledons short, broad.

Leaves narrow; petiole short (not exceeding 1 in.):—

Flower heads in dichotomous cymes:—

Leaves smooth above, ashy beneath. .. 1. *D. longifolia*.

Flower heads sessile or sub-sessile:—

Leaves scabrous above, white beneath. .. 2. *D. hypoleuca*.

Leaves broad; petiole long (exceeding 1 in.):—

Branchlets pubescent or scabrid:—

Leaves ashy-grey, tomentose beneath;
lateral nerves to the midrib above basal
upto 3 on either half. .. 3. *D. dentata*.

Branchlets glabrous or nearly so :—

Leaves white with closely adpressed tomentum beneath; lateral nerves to the midrib above basal into 5 on either half .. 4. *D. Wallichiana*.

1. *Debregeasia longifolia* Wedd. Syn. *Debregeasia velutina* Gaud. Vern. *Bayo-asing*, *Dalah-asing*, Miri and Abor.; *Soh-sinting*, *Soh-tyrsim*, *Stein-la-doh*, Khasi.

A large spreading shrub or small tree; young shoots silky-pubescent. *Bark* dark-brown, corky on old stem; blaze pink. *Leaves* 2-7 by $\cdot 3\cdot 1\cdot 5$ in., oblong-lanceolate or narrow-elliptic, oblong, acuminate, serrulate, subcoriaceous, rugose, scabrid and dark-green above, pale-white or ashy tomentose beneath; 3-nerved; lateral nerves from the midrib 2-3 on either half; base acute or rounded; petiole $\cdot 3\cdot 1\cdot 2$ in. long; stipules scarious, 2-fid., up to $\cdot 3$ in. long. *Flowers* in lateral dichotomous panicles. *Male flowers* bracteoles sub-orbicular; sepals exceeding the bracteoles; pistillode glabrous. *Female flowers* bracteoles narrower. *Fruit* an aggregate of achenes, in clusters, $\cdot 3$ in. across, contained in the fleshy perianth, orange yellow.

N. E. F. TRACT, GARO HILLS, NOWGONG, KAMRUP AND K. & J. HILLS (5,500 ft.).

The fruit is edible. The fibre obtained from this plant is of superior quality and is used for cordage.

Flrs. Rainy & Autumn season. Fr. Cold season.

2. *Debregeasia hypoleuca* Wedd.

A large evergreen shrub. *Bark* blackish-grey, warty; inside fibrous, light cinnamon; branchlets clothed with snow-white wool. *Leaves* alternate, 3-6 by $\cdot 5\cdot 1\cdot 2$ in., oblong or linear-lanceolate, acuminate, serrulate, rather coriaceous, scabrous and raised dotted above, thickly white pitted beneath; 3-basal nerved; lateral nerves to the midrib 3-5 on either half; petiole $\cdot 3\cdot 1$ in. long. *Male flowers* sepals shorter than the bracteoles. *Fruit* an aggregate of amber coloured achenes, in clusters, sweet but insipid and mucilaginous, $\cdot 3$ in. across, succulent.

KAMRUP (Kanjilal).

The ripe fruit is edible. The fibre is made into rope or twine.

Flrs. 4-5. Fr. 6-8.

3. *Debregeasia dentata* Hk. f. Vern. *Lebang*, Lushai.

A much branched bushy shrub, about 10 ft. high; stem brownish-green, warty; branchlets pubescent or scabrid. *Leaves* 3-7 by 1-4 in., orbicular-ovate or elliptic-ovate, cuspidate, dentate, acute or acuminate, membranous, scabrid above, ashy tomentose beneath; 3-basal nerved; lateral nerves to the midrib above the basal 2-4 on either half: base rounded or obtuse; petiole 1-5 in. long, slender. *Female heads* in short sessile dichotomous cymes with slender ramification. *Fruit* an aggregate, in clusters, reddish-brown, .15-.2 in. across.

SIBSAGAR & CACHAR.

Flrs. 10-12. Fr. 1.

4. *Debregeasia Wallichiana* Wedd. Vern. *Dieng-laramphang*, Khasi; *Lek-pangara*, Nep.; *Dieng-sha-pallang*, Synt.

A small tree, often epiphytic, with an umbrella like spreading crown; young parts pubescent or tomentose. *Leaves* 2-12 by 2-9 in., orbicular or broadly ovate, cuspidate or acuminate, entire or sinuate-serrate, coriaceous, glabrous above, white with dense adpressed tomentum beneath; base 3-nerved; lateral nerves to the midrib above the base 3-6 on either half, very prominent; base rounded, shallow cordate; petiole 2-10 in. long, stout. *Flowers* in dichotomous cymes; peduncles 2-3 in. long. *Male flowers* sepal exceeding the bracteoles. *Fruit* an aggregate of achenes, in succulent clusters, .2-.25 in. across, pinkish.

GARO HILLS and K. & J. HILLS (5,000 ft.).

Flrs. 6. Fr. 9-10.

11. MAOUTIA Wedd.

Maoutia Puya Wedd. Vern. *Ja-khi*, *Bad-langmyrsau*, Khasi.

A shrub; bark purplish-grey with vertical lines of brown lenticels; young parts hairy. *Leaves* alternate, 2-2.7

by 1·1-2·7 in., elliptic, obovate-elliptic, cordate, acuminate, coarsely dentate or crenate, membranous, scabrid above, white felted beneath; 3-nerved; base rounded or obtuse; petiole ·5-3·5 in. long, slender, pubescent; stipules connate, 2-fid. *Flowers* minute, monœcious or diœcious, in small cymose globose heads dichotomously paniced (sometimes androgynous). *Male flowers* sepal 5, valvate; stamens 5, inflexed in bud; pistillode woolly. *Female flowers* perianth 0. *Ovary* straight; stigma penicillate; ovules erect. *Achene* very small, about ·05 in. long, ovoid, hispid, with a fleshy pericarp, triquetrous.

N. E. F. TRACT and K. & J. HILLS (4,600 ft.).

A fine white strong fibre is obtained from the plant which is useful in making fishing nets, twine, etc.

Flrs. 6-7. Fr. 10-11.

FAM. 127. JUGLANDACEÆ.

Trees, rarely shrubs, often strongly aromatic. *Leaves* alternate, pinnate, exstipulate. *Flowers* monœcious; the male flowers appearing as catkin in the twigs of the previous year; the female as sessile flowers on the stem of the current year, sub-solitary or spicate. *Perianth* 0 or rudimentary. *Stamens* 3-40 (more in the lower flowers); anthers 2 or more, nearly sessile. *Perianth* epigynous in female flower. *Ovary* 1-celled; ovules 1, erect, orthotropous; style short; stigma 2. *Fruit* drupe or nut. *Seeds* exalbuminous; cotyledons oily, lobed, contorted or corrugated; radicle superior.

Female flowers solitary (2-3) :—

Bracts not enlarged in fruit (drupe) .. **1. Juglans.**

Female flowers spicate :—

Bracts produced into a wing in fruit

(Nut).

.. **2. Engelhardtia.**

1. JUGLANS Linn.

Juglans regia Linn. Vern. The walnut. Vern, *Akhrot*, Beng. and Hind.

A large aromatic deciduous tree; shoots velvety. *Bark* grey, longitudinally fissured. *Leaves* imparipinnate, 6-15 in. long, thickly tomentose when young. *Leaflets* 5-13, subsessile, opposite or sub-opposite, 3-8 by 2-4 in., elliptic-oblong, often oblique, usually entire, acute or acuminate, coriaceous, pubescent along the nerves beneath or with tuft of hairs at the axils of the nerves; lateral nerves 15-20 on either half; base rounded or obtuse. *Male catkins* green, 2-5 in. long, often in pairs; bracts stalked, oblong, lobed. *Stamens* 10-20 or more. *Female flowers* 1-3. *Calyx* obscurely 4-toothed. *Petals* 4, green. *Stigma* more or less fleshy. *Fruit* 2 in. long, ovoid, glabrous or pubescent, green, with yellow dots; pericarp leathery, aromatic; shell 1-1.5 in. long, 2-valved; cotyledons irregularly corrugated.

MISHMI HILLS (5,000 ft.) & AKA HILLS (N. L. Bor). Cultivated in Shillong (K. & J. Hills).

The fruit is the well-known *walnut* of commerce. Bark is used as a dye and also medicinally as an anthelmintic and detergent. The leaves are astringent and tonic.

Timber is very valuable, weight 40-50 lbs. per c. ft. Heartwood greyish-brown with darker streaks, mottled; seasons and polishes well and has a great demand for gun-stock and ornamental furniture.

Flrs. 2-4. Fr. 7-8.

2. ENGELHARDTIA Leschen.

Trees or shrubs. *Leave* pinnate; leaflets entire or serrate, usually glandular, punctate beneath; stipules 0. *Flowers* monœcious. *Male flowers* in slender simple or bracteate erect or pendulous lateral spikes; perianth connate with simple lobed or laciniate usually very unequal bracts or scales, sometimes irregularly 4-lobed, resembling calyx; stamens 4-12, subsessile on the scales. *Female flowers* in pendulous spikes; perianth adnate to ovary, solitary, sessile on a 3-4 lobed bract; limb 4-lobed or toothed; stigmas 2, short, sessile or long, laciniate. *Fruit* a small globose nut, adnate to the much enlarged, scarious, 3-lobed, reticulately nerved bract with mid-

lobe exceeding the lateral; epicarp or calyx thin, glandular-hirsute; endocarp 2-valved.

(Brandis has combined *E. spicata* Bl. *E. acerifolia* Bl. and *E. Colebrookiana* Lindl. as *E. spicata* Bl. p. 620, Indian Trees. I have followed Hooker, F. B. I., p. 595-96, Vol. V).

Nuts villous :—

Leaflets sub-opposite petiolulate, pubescent.

2-8 in. long, ultimately :—

Middle bracts upto 3 in. long :—

Female spike 6-13 in. long. .. 1. *E. spicata*.

Leaflets 6-13, petiolulate, pubescent, sub-opposite, 1-5-6 in. long, terminal often absent; nerves beneath densely tomentose :—

Middle bracts upto 1-9 in. long :—

Female spike 4-6 in. long. .. 2. *E. Colebrookiana*.

Nuts hispidly hirsute; leaflets sessile, 5-7 in. long; nerves beneath tomentose. .. 3. *E. acerifolia*.

Nuts glabrous :—

Male flowers in terminal spikes :—

Leaflets elliptic or oblong :—

Exocarp glabrous. .. 4. *E. polystachya*.

Male flowers in paniced spikes :—

Leaflets sub-falcately lanceolate or elliptic :—

Exocarp clothed with golden scale. .. 5. *E. Wallichiana*.

1. Engelhardtia spicata Blume. Vern. *Wakru*, *Bolsne*, Garo; *Lal-amiri*, *Lewa*, Ass.; *Jabha*, Kamrup; *Marle-arong*, Mik.; *Tappa-changne*, Tipp.; *Dieng-lamba*, *Dieng-lyba*, Khasi; *Dieng-duba*, Synt.

A large deciduous tree (100'/224'') often gregarious; base often buttressed. *Bark* grey or greyish-brown, rather rough, vertically split, exfoliating in small flakes about 1 in. broad, .7 in. thick, fibrous; inside light or deep red, with rather broad and irregular streaks of lighter tissue; branches lenticellate. *Leaflets* 4-13, sub-opposite, 2-8 by 1-2-2 in., narrow-oblong, oblong-lanceolate or elliptic-lanceolate, acute or obtuse, nearly entire, rather sub-coriaceous, glabrescent above, pubescent beneath, ultimately glabrate, clothed with orbicular glands; lateral nerves 8-13 on either half; base very unequal; petiole .05-.3 in. long. *Male flowers* in

slender catkins, 2-8 in. long, often paniced. *Female flowers* in pendulous spikes, 6-13 in. long; middle bract in fruit 2-3 in. long. *Nut* globose, .2-.3 in. across, villously hispid.

LAKHIMPUR, SIBSAGAR, NOWGONG, DARRANG, KAMRUP, GARO HILLS, GOALPARA, CACHAR, N. C. HILLS, SYLHET, K. & J. HILLS & AKA HILLS, (upto 5,000 ft.).

Wood cream-coloured or reddish grey, moderately hard with a silvery lustre on radial section. The timber is useful, used for tea and packing boxes, suitable for curving.

Lac is raised on this tree by Garos. Bark is also used to intoxicate and kill fish.

Flrs. 11-12. Fr. 3-4.

2. Engelhardtia Colebrookiana Lindl. Vern. *Pasomasi*, *Ja-masi*, *Deing-parso-masi*, Khasi; *Dieng-chim*, Synt.

A small deciduous tree, often with spreading crown, sometimes gregarious. *Bark* brown, rough, .5 in. thick; inside fibrous, light red, with faint distant streaks of whitish tissues. *Leaflets* 6-13, the terminal usually smallest, often absent; the laterals sub-opposite, 1.5-6 by 1.3 in., oblong, obovate or elliptic-oblong, rounded or bluntly acuminate, entire, sub-coriaceous, glabrescent above, densely tomentose beneath; lateral nerves 9-12 on either half; base conspicuously unequal-sided; petiole .05-.2 in. long. *Male flowers* in cylindrical lateral catkins or rarely at the lower half of female spikes. *Female flowers* in pendulous spikes. *Nut* .2-.3 in., globose, villously hirsute; middle bract of fruit 1.1-2.5 in. long.

DARRANG, KAMRUP, GARO HILLS AND K. & J. HILLS, (upto 3,000 ft.).

Wood greyish, moderately hard, even grained with very fine wavy interrupted concentric lines, with a satiny silver grain on radial section (Gamble).

The leaves are cattle fodder.

Flrs. 2. Fr. 4-5.

3. Engelhardtia acerifolia Blume.

A large deciduous tree. *Leaflets* 5-7 in., sessile or subsessile, linear-oblong, entire or serrate; petiole and nerves beneath tomentose. *Nut* hispidly hirsute.

K. & J. HILLS, (Griffith).

(F.B.I., Vol. V., p. 596 possibly only a form of *E. spicata* Bl.).

4. Engelhardtia polystachya Radlk. Vern. *Lewa*, *Chhal-bih*, Ass.; *Phekphe*, Tipp.; *Rudek*, Garo; *Dieng-byntal*, *Dieng-btah*, Khasi; *Mowa*, Nep.; *Tamukchangne*, Duffla; *Suriarong*, Mik.; *Saribang-ching*, Naga; *Sarong-phang*, Kach.; *Dieng-kapta*, Synt.

A middle sized or large tree (upto 100'/70''); stem fluted. *Bark* dark-brown, roughly and longitudinally fissured; inside fibrous, light yellow at first but soon turning deep amber yellow. *Leaves* usually paripinnate, red when young. *Leaflets* 2-8 by 1-3 in., usually opposite, elliptic or oblong, acute or obtuse, coriaceous, glabrous above, clothed with golden peltate glands beneath; lateral nerves 8-10 on either half, sub-parallel; base unequal; petiolule .05-.5 in. long. *Male flowers* in slender terminal spikes, often fasciculate; bracts membranous, middle one in fruit up to 1.9 in. *Nut* glabrous, .1-.15 in. across.

LAKHIMPUR, SIBSAGAR, DARRANG, GARO HILLS, CACHAR, SYLHET, N. C. HILLS and K. & J. HILLS, (upto 4,000 ft.).

Bark is used to intoxicate and kill fish.

Flrs. 2-5. Fr. 10.

5. Engelhardtia Wallichiana Lindl.

A glabrous tree. *Leaves* paripinnate; petiole 3-4 in. long. *Leaflets* 2-4 pairs, 3.6 by 1.5 in., falcately lanceolate or elliptic, entire, sub-coriaceous, glabrous; base somewhat oblique, lateral nerves 8-9 on either side (with shorter and finer intermediate ones also); petiolule .2-.3 in. long. *Male flowers* in sub-erect paniced spikes; stamens about 12; anthers didymous. *Female flowers* perianth 4-lobed, ovary globose; stigmas 4. *Nut* globose, .15 in. across, clothed with small golden scales, crowned with the persistent perianth segments. *Fruiting* spike 6-9 in. long; middle bract (winged) upto 1.9 in. long.

K. & J. HILLS—Umsaw.

Fr. 7.

FAM. 128. MYRICACEÆ.

Aromatic trees or shrubs, monœcious or diœcious. *Leaves* alternate, simple, exstipulate. *Flowers* in simple rarely compound bracteate spikes, achlamydeous. *Stamens* 2-16, usually 4 on a torus adnate to the bract; filaments free or connate at the base. *Ovary* 1-celled; ovule 1, basal, orthotropous; stigma 2-fid. *Drupe* ovoid or globose, resinous, succulent or waxy; endocarp hairy. *Seed* exalbuminous; embryo straight; cotyledons plano-convex; radicle superior.

MYRICA Linn.

Myrica Farquhariana Wall. Syn. *Myrica Nagi* Thunb. Vern. *Soh-phi*, Khasi; *Naga-tenga*, Ass.

A small or moderate sized evergreen tree (40'/40"). *Bark* greyish-brown, rough, vertically wrinkled, finely fibrous, .3 in. thick, reddish-brown; inside mottled with yellow streaks; extremities pubescent. *Leaves* 2-6 by .5-1.5 in., lanceolate, oblanceolate or obovate, nearly entire or sharply spinous-serrate, obtuse or acute, coriaceous, glabrous above, with resinous dots beneath; lateral nerves 12-20 on either half, anastomising at the ends to form a marginal vein; base acute; petiole .2-.6 in. long. *Male spikes* sometimes with female flowers at the top. *Fruit* about 1 in. long, ellipsoid or ovoid, tubercled, reddish or cheese coloured when ripe.

SIBSAGAR (Dikho Valley), NAGA HILLS and K. & J. HILLS, (upto 6,000 ft.).

The ripe fruits are edible and make a very refreshing drink in the hot weather.

The bark is used as an aromatic stimulant and externally as a plaster for rheumatism. It has other medicinal properties e.g., resolvent, astringent and carminative; also cures catarrh and headache. It is one of the best of Indian bark dyes, the colour produced being yellow (Gamble). It is also used to poison fish.

M. sapida *Wall.* Synonymous with *M. Farquhariana* *Wall.* (F.B.I., p. 597). There is however some marked difference in the extreme forms in the leaves and fruits, but there are intermediate forms in the local collections where these differences merge.

Flrs. 10-11. Fr. 3-4.

FAM. 128a. CASUARINACEÆ.

CASUARINA *Forst.*

(Only one genus).

1. *Casuarina equisetifolia* *Forst.* Beef-wood tree.
Vern. *Bilati-jhau*, Beng.

A large handsome tree; branchlets drooping, sulcate, jointed, grooved, cylindric; internodes ending in a sheath of 6-8 scale-like leaves. *Male flowers* in terminal spikes, numerous at the ends of the same branches at which the females are borne; bracts subulate, pubescent on the margin; perianth concave, circumsciss at base; stamen 1, inflexed in bud; anthers large. *Female flowers* in ovoid ellipsoid or globose heads which are tomentose; bracts subulate, externally erect, with a broad horizontal base internally which is lignified in the fruit, the remaining portion of the bract remaining unaltered; bracteoles ultimately about .25 in. long, valvately closed till the seed is ripe; stigma filiform, bifid almost to the base; ovules 2, collateral. *Fruit* resembling a cone formed of the enlarged bracts and bracteoles, .5-.75 in. long. *Seeds* with wing .18 in. long.

GOALPARA (Dhubri) & LAKHIMPUR (Dibrugarh). Cultivated.

Flrs. Hot season. Fr. 7 onwards.

I agree with Mr. Haines and also find the specimen in the local herbarium monœcious (F.B.I.; V., p. 598).

FAM. 129. FAGACEÆ.

Deciduous or evergreen trees, rarely shrubs. *Leaves* alternate, penninerved, generally serrate. *Flowers* monœcious. *Male flowers* in pendulous catkins; perianth campanulate, 4-8 cleft or partite; stamens as many or twice as many as the perianth segments; pistillode rudimentary or obsolete. *Female flowers* solitary in each involucre; perianth tube adnate to the ovary; limb minutely toothed; staminodes minute or obsolete. *Ovary* 3-celled; style 3; ovules 2 in each cell. *Fruit* (acorn) a one seeded nut seated on a cup (cupule) formed by the coalescence of numerous enlarged and hardened bracts or scale; cotyledons thick, fleshy, hypogeal. "*Pith* in most species pentagonal, the angles often projecting. *Medullary* rays of 2 classes, very broad and narrow. Some species have uniformly very fine rays numerous and equidistant". Wavy soft, more or less concentric bands of wood-parenchyma (often very narrow) in most species. Wood fibres with bordered pits.

Ovary 3-celled :—

Nut 1 :—

Cupule cup-shaped, not enclosing the nut :—

Stamens 6, leaves serrate. 1. **Quercus.**

Cupule entirely covering the nut :—

Stamens 12; leaves entire not spinous. 2. **Pasania.**

Nut 1-4 :—

Involucre completely enclosing the nuts,

spinous or tuberculous. 3. **Castanopsis.**

Ovary 6-celled :—

Flowers in 3; nuts enclosed in the spinous involucre. 4. **Castanea.**

1. QUERCUS Linn.

Monœcious, deciduous or evergreen trees, rarely shrubs. *Leaves* alternate, penninerved. *Flowers* small or minute, bracteolate; male flowers usually in drooping spikes or panicles; female flowers in erect unisexual or androgynous spikes. *Male flowers* perianth segments usually 6; stamens

6; pistillode hairy or obsolete. *Female flowers* solitary or in clusters each enclosed in an involucre or imbricate scales; perianth adnate to the ovary; limb minutely toothed. *Ovary* inferior after fecundation, more or less completely 3-celled (rarely more) with 2 ovules in each cell; stigma broad, covering the inner surface of the styles or cupulate. *Nut* (usually called an acorn) 1-celled, ovoid globose or turbinate, surrounded by the accrescent cupuliform hardened involucre. *Seeds* 1 or 2; cotyledons thick, fleshy, planoconvex; radicle minute.

- I. Male spikes simple, slender, lax, pendulous; involucre of fruit usually in short spikes, cup-shaped. Bracts imbricate; apices free. Leaves dentate or lobed:—

Mature leaves hairy or tomentose beneath:—

Glans globose; leaves entire or spinescent, dentate.

1. *Q. semecarpifolia.*

Glans elongate, ovoid; leaves coarsely dentate-serrate.

2. *Q. Griffithii.*

Mature leaves glabrous:—

Acorn sub-globular; Leaves setaceous, serrate.

3. *Q. serrata.*

- II. Male spikes as in I. Involucre forming a cupule, the bracts connate into concentric laminæ or zones; edges entire, crenate or denticulate. Leaves serrate or dentate:—

Glans ovoid or ovoid-cylindric, exserted, less than half enclosed in the cup:—

Leaves lanceolate, coriaceous:—

Glans ovoid nearly 2 in. long. .. 4. *Q. semiserrata.*

Glans ovoid less than 1 in. long. .. 5. *Q. glauca.*

Glans globose:—

Leaves thinly chartaceous, entire or sub-repand towards the apex. ..

6. *Q. patkoiensis.*

Glans hemispheric; apex more or less depressed:—

Leaves, thinly coriaceous lanceolate, acuminate, glaucous beneath, sometimes entire.

7. *Q. lineata.*

Glans turbinate, only half enclosed by the cupules:—

Leaves ovate-lanceolate, blunt, tomentose beneath.

8. *Q. Helferiana.*

- Glans turbinate, almost enclosed by the large lamellate cupule. 9. *Q. lamellosa*.
- III. Male spikes erect, stiff. Bracts connate into entire or denticulate lamellæ. Leaves entire, finely stellately hairy underneath :—
- Nuts depressed, grey, velvety. 10. *Q. Thomsoni*.
- IV. Male spikes erect, stiff. Involucre ovoid or globose, enclosing the whole nut, marked on the outside with concentric belts or densely clothed with acuminate scales. Tips sometimes free. Leaves quite entire :—
- Involucre with concentric belts and a few scales or tubercles :—
- Glans silky, glabrous, rugose. Apex not free. 11. *Q. lanceæfolia*.
- Glans depressed-globose, polished. Apex free. 12. *Q. Olla*.

1. *Quercus semecarpifolia* Smith. Vern. *Dieng-sheh-Dingiem*, Synt. *Dieng-sia-soh-dingim*, Khasi.

Usually a large or middle-sized tree (in Assam, shrubby or a small tree). *Bark* dark ashy-grey, cracked into more or less 4-sided scales; inside reddish, coarsely granular; young parts softly ferruginous tomentose. *Leaves* 1-2·5 by ·5-1·3 in., elliptic or oblong, very spinous on young plants and more or less entire on mature ones (intermediate between *Q. dilatata* and *Q. semecarpifolia*) usually obtuse, coriaceous, glabrescent above, stellate pubescent beneath; lateral nerves 8-10 on either half, horizontal near the base, bifurcating about half way up, quite strong beneath, depressed above; base cordate; petiole ·1-·12 in. long. *Male spikes* crowded, 2-6 in. long; perianth segments obtuse, ciliate. *Female inflorescence* few-fld, in axillary peduncles; style recurved; *Acorns* usually solitary on previous year's shoot, globose, black when ripe, 1 in. across; cupule enclosing about a third of the glan, small, thin; scales ovate, acute.

K. & J. HILLS. (4,200 ft.).

Heartwood reddish-grey, hard, close grained. Annual rings not very distinct. A few broad medullary rays with numerous very fine ones between. Weight 53 lbs. per c.ft.; good fuel, also used for

building purposes. "Silver grain not conspicuous but characteristic." (Gamble).

The Assam form is slightly variable but the bifurcation of the main nerves half way up only is a definite diagnostic character.

Flrs. 5. Fr. 8-9. 15 months after flowering (U. N. Kanjilal).

2. *Quercus Griffithii* Hk. f. & Th. Vern. *Dieng-wah*, Khasi.

A large, or small deciduous tree; young parts usually rusty-pubescent. *Bark* warty, dark ashy-grey, deeply furrowed; blaze reddish, fibrous. *Leaves* 4-9 by 2-5 in., obovate, obovate-oblong or oblanceolate, acute or sub-acuminate, more or less coarsely dentate, serrate, usually entire towards the base, coriaceous, glabrous above when mature, softly rusty pubescent beneath when young, yellowish-grey pubescent when mature; lateral nerves 12-17 on either half, almost parallel, terminating in the denticulation, conspicuous; base subcordate, rounded or cuneate; petiole .1-.4 in. long, pubescent; stipules linear, hairy, fugacious. *Male spikes* fascicled at the base of the young shoots, subpendulous. *Perianth* segments 5-6, hairy. *Stamens* 8-12; anthers hairy. *Acorns* almost sessile, in clusters of 2-5 at the end of branchlets; cupule hemispherical, .3 in. deep, about .5 in. across, slightly sericeous outside, smooth inside; scales ovate, rather acute, adpressed, narrow towards the upper end. *Glans* ovoid, smooth, .5-.6 in. long; style base persistent.

KHASI HILLS & NAGA HILLS, 4-6,000 ft.

Wood very hard, brown. The timber is used for building and other purposes locally.

Male Flrs. 6. Young Fr. 7.

Var. oblonga King.—Leaves oblong, slightly obovate, shortly acuminate, sub-entire or slightly dentate; undersurface puberulous or subglabrous, not pale.

NAGA HILLS (C. B. Clarke) & KHASI HILLS (Mann).

3. *Quercus serrata* Thunb. Var. *Roxburghii* A.D.C.

A middle-sized or large deciduous tree (60'/60''), straight stemmed; young parts softly pubescent. *Bark* dark-grey, .75 in. thick, split both vertically and horizontally; inside brown, granular. *Leaves* 3-8 by 1-3 in., lanceolate,

oblong-lanceolate or elliptic-lanceolate, acute or acuminate, serrate, thinly coriaceous, glabrous and shining when mature, hairy along the midrib beneath; lateral nerves 10-20 on either half, prominent, almost parallel, each nerve terminating in a serrature and forming the setæ; base rather rounded; petiole .5-1.5 in. long; stipules oblong. *Male spikes* elongated, rachis tomentose; anthers glabrous; stamens about 10. *Female flowers* on short axillary spikes; style filiform. *Acorns* solitary or in pairs, almost sessile on the previous year's shoot; cupule woody, hard, embracing $\frac{3}{4}$ of the ripe glan; scales much imbricate, numerous, ovate-lanceolate, spreading, hoary, with serrate vertical ridges outside, the lower rows much reflexed. *Glans* bitter (not eaten), sub-globose, apiculate, smooth when ripe, .75-1 in. across.

KHASI HILLS, 2,500-5,500 ft. N. C. HILLS, NAGA HILLS & MANIPUR, (upto 5,500 ft.).

Wood dark greyish-brown with large pores in spring wood: "Concentric bands of wood parenchyma obscure" (Brandis). Medullary rays of 2 kinds, broad compact rays alternating with many very numerous and fine ones. Broad rays show a conspicuous silver grain on radial section; weight 58 lbs. per c. ft. (Gamble).

Fuel; timber is used for building purposes also.

Flrs. 6. Fr. (Mature) 1-2.

4. *Quercus semiserrata* Roxb. Vern. *Sehop*, Lushai; *Phakhoh*, Kuki; *Suchhi-arong*, Mik.; *Sekho*, Tipp.; *Ramrota*, Cach.

A large or middle-sized evergreen tree (100'/60"); young shoots softly fulvous-tomentose. *Bark* grey, rough, hard, .5 in. thick; inside dark-brown, with distant yellowish streaks; old stem very irregularly buttressed, furrowed and fluted. *Leaves* 3-8 by 1-3 in., oblanceolate, oblong or elliptic-lanceolate, acute or shortly acuminate, coarsely serrate or semi-serrate towards the apex, coriaceous, glabrous above, glaucous or glaucescent beneath; lateral nerves 10-14 on either half, straight, prominent beneath; base obtuse or cuneate, often unequal sided; petiole .5-1 in. long. *Male spikes* solitary, axillary, 2-3 fld. *Styles* long, bifurcated; stigma sub-capitate. *Cupule* annulate, hemispheric, .6 by .9 in. covering about $\frac{2}{5}$ of the glan; the lamellæ

4-6, velvety-tomentose outside, smooth, purplish inside. *Glans* (mature) cylindric, ovoid, 1.25-1.5 by .75 in., canescent with an annulate conical beak .2 in. long.

CACHAR, SYLHET, N. C. HILLS, KHASI HILLS, GARO HILLS & MANIPUR (upto 4,000 ft.).

Heartwood hard, reddish-brown. Medullary rays fine without any broad ones.

Fr. 11-3.

Var. Mannii. Vern. *Phong-rong-long-poh*, Mik. A large tree 6'—8' in girth. *Bark* whitish, .3 in. thick; blaze brown; wood hard. *Leaves* 4-6 in. long, narrowed at the base; nerves about 14 on either side. *Cupule* with thick everted mouth, villously tomentose.

LAKHIMPUR, SIBSAGAR & KHASI HILLS.

Fr. 1.

5. *Quercus glauca* Thunb. Vern. *Dieng-syrtap*, *Dieng-rih*, Khasi; *Dieng-sari-war*, Synt.

A large evergreen tree. *Bark* blackish-grey, granular, warty, .13 in. thick; blaze brown, with white vertical lines. *Leaves* 2.5-5 by .5-2 in., oblong-lanceolate to ovate-lanceolate, rather caudate-acuminate, more or less sharply serrate half way towards the apex, coriaceous, glabrous above, glaucous beneath or sometimes finely pubescent; lateral nerves 10-14 on either half, prominent beneath; base acute or obtuse; petiole .4-.8 in. long, slender. *Male spikes* axillary, solitary or paniced; bracts early deciduous; perianth segments 4-5; stamens 4-5. *Female spikes* axillary, solitary 2-5-flowered; styles 3. *Cupule* sessile, hemispheric, annulate, grey tomentose, .3-.5 in. in diameter, the lower lamellæ crenate or denticulate. *Glans* much exserted, ovoid, shining, apiculate.

KHASI HILLS, (4-5,000 ft.).

Wood hard, but is very little used. Weight about 58 lbs. per c.ft.

Flrs. 3-5. Fr. Cold season.

6. *Quercus patkoiensis* A. Camus.

A tall tree; *branches* almost tomentose. *Leaves* 5-6.3 in. long, 1.5-2.2 in., broad, assymetric, lanceolate or ovate-

lanceolate, acuminate, entire or sinuate, glabrous above, pilose beneath; lateral nerves 9 on either half; base attenuate; petiole tomentose, .7-1 in. long. *Cupule* sub-hemispheric, 1-1.3 in. broad, .4-.6 long, 9 zonate. *Glans* ovoid or sub-ellipsoid, with a truncate base (apex mucronate), 1.5 in. long, 1-1.2 in. in diameter.

PATKOI MOUNTAINS, ASSAM. (R. S. Hole 22).

(Bulletin De la Socite Botanique De France LXXX 1933 p. 353).

7. *Quercus lineata* Bl. *Dieng-lingim*, Khasi.

A small or middle-size tree. *Bark* grey, rather plain; inside slightly fibrous, deep pinkish, .4 in. thick. *Leaves* 2.5-4.5 by 1-1.6 in., lanceolate to ovate or oblong-lanceolate, thinly coriaceous, acuminate, glabrous and shining above, glaucous or minutely pubescent beneath; lateral nerves 13-16 on either half; base acute, obtuse or rounded; petiole .4-.6 in. long. *Male spikes* in small fascicles; perianth segments 4; stamens 4. *Female spikes* on different trees, solitary, axillary. few flowered; stigma sub-capitate. *Capule* sessile when young; ripe cupule cup-shaped or saucer-shaped. *Ripe glans* hemispheric, more or less depressed; base truncate.

According to King (Annals Royal Botanic Garden, Calcutta II 32-33). *Q. lineata* (type) with entire leaves does not occur in India. The following varieties are recorded.

Var. oxydon :—Leaves oblong-lanceolate, strongly spinose, serrate (except at the base) glaucous beneath; ripe cupules hemispheric; lamellæ about 7. *Glans* hemispheric; base truncate, smooth.

KHASI HILLS & NAGA HILLS, (3-5,000 ft.).

Fr. 7-9.

Var. Lobbii.—Young branches, young cupule and under side of leaves minutely tomentose.

Var. Griffithii.—Leaves sub-entire, much acuminate.

KHASI HILLS, (3,000 ft.).

Fr. 8-10.

8. *Quercus Helferiana* A. D C.

A small tree; young parts rusty-tomentose. *Leaves* 5-7 by 2-3, elliptic or ovate-lanceolate, acute or sub-obtuse, serrate

towards the apex, shining above except the midrib and the nerves which are laxly sericeous when young, densely tomentose beneath; lateral nerves 9-12 on either half, prominent beneath; petioles stout .5-.75 in. long. *Cupule* thick, flat, patelliform. *Glans* turbinate, hemispheric, apiculate, base truncate, .75 in. across and .4 in. long, minutely lepidote, tomentose.

MANIPUR, (2,500-3,000 ft.).

Flrs. 2. Ripe fruit 8-10.

9. *Quercus lamellosa* Smith.

A magnificent tree; young part fulvous-tomentose. *Leaves* 7-9 by 2.5-4.5 in., oblong or elliptic, acute or acuminate, remotely and sharply serrate towards the apex, coriaceous, glabrous above, glaucous beneath except the nerves, which are pulvinous (when young); lateral nerves 10-20 on either half; base acute, rarely obtuse; petiole 1.25-1.75 in. long. *Male spikes* solitary, axillary, shorter than the leaves. *Female* spikes very short, axillary, 3-4 flowered. *Cupules* very large, embracing $\frac{2}{3}$ of the glan. *Glans* turbinate when ripe, apiculate, 1.5 in across and 1.25 in long.

NAGA HILLS & DUFFLA HILLS, (5,000-8,000 ft.).

Flrs. 7. Young fr. 1-3. Ripe fr. 9-11.

10. *Quercus Thomsoni* Miq.

A large tree 80-100 ft. high; young parts deciduously puberulous. *Leaves* 2.5-6 by 1-2 in., oblong-lanceolate, acuminate, entire, glabrous or slightly glabrescent above, glabrescent and pale beneath; lateral nerves 10-13 on either half; base narrowed; petiole .3-.6 in. long. *Spikes* terminal, solitary or fascicled, mostly androgynous. *Male flowers*—perianth segments 6; stamens 12. *Female flowers* in clusters of 3, sessile; styles 3, spreading. *Cupule* woody, saucer-shaped, .5-.7 in. across, enclosing only the base of the glan; scales pubescent, connate, tips free. *Glans* globose or pyriform, grey tomentose, crowned with remains of the style,

mature $\cdot 4\text{--}\cdot 65$ in. across. *Ripe fruit* solitary (by abortion), often crowded on a stout rachis.

KHASI HILLS, (2,000-5,000 ft.). Also Patko's Range—R. N. De.
Flrs. Hot season. Ripe fruit 7.

11. *Quercus lanceæfolia* Roxb. Vern. *Sarong-jola*, Mech.; *Chakho-misri*, Garo; *Phong-rong-arong*, Mik.; *Dieng-sning-rit*, *Dieng-rit*, *Dieng-patlua*, Khasi; *Shakma*, Sylh.; *Peltekong*, Tipp.

An evergreen tree (60'/60"). *Bark* greyish-brown with close fissures and cracks, $\cdot 16$ in. thick; inside reddish-brown, fibrous, with streaks of lighter tissue. *Leaves* $1\cdot 5\text{--}5$ by $1\text{--}2$ in., lanceolate or oblong-lanceolate, abruptly acuminate, entire, thinly coriaceous, smooth and shining above, with metallic lustre underneath; lateral nerves 9-11 on either half (rarely up to 16?), prominent, arcuate; base-acute or rounded; petiole $\cdot 4\text{--}\cdot 7$ in. long. *Spikes* in large terminal tomentose panicles (some androgynous). *Male flowers* puberulous, solitary; perianth segment 6; stamens 12. *Female flowers* in panicles or few near the apex of the spikes. *Cupules* completely enclosing the glans, splitting up irregularly setting free the glans, ovoid, crustaceous, marked with 4-6 ridges which are entire or denticulate; styles united penetrating the apex of the glans. *Glans* glabrous, rugose, about 1 by $\cdot 5$ in.; base of ripe fruit often oblique.

GOALPARA and K. & J. HILLS, (upto 5,000 ft.).

Wood cream-coloured, hard, with numerous fine equidistant medullary rays and very few broad ones; used for building purposes.

Flrs. Cold season. Ripe fruit following cold season.

Var. *semicristata* King. Vern. *Dieng-sning-dingngin*. Khasi. Cupules smaller, the ridges sharply denticulate.
KHASI HILLS (G. Mann).

12. *Quercus Olla* Kurz.

Bark dark coloured, smooth. *Fruit* spikes stout, about 4 in. long. *Cupules* distinct with 1 or 2 abortive ones adnate to the base, subturbinate, 1 in. in diameter and $\cdot 5$ in. thick, thick walled, woody, minutely tomentose; scales numerous,

broad, abruptly acuminate, in regular vertical rows. *Glans* depressed globose, polished; the apex free.

ASSAM (Jenkins). (No specimen in Forest Herbarium, Shillong).

***Quercus Engleriana* Seem.**

A large tall evergreen tree with unbranched trunk and big spreading crown.

Delei Valley, ASSAM. 6,000-8,000 ft. (K. Ward 8053 and 8305). (No specimen in Forest Herbarium, Shillong).

2. PASANIA Oerst.

Oaks. *Leaves* entire. *Male spikes* erect, simple or panicle. *Female flowers* in short distinct spikes or at the base of some of the male panicles. *Stamens* 12. *Stigma* a terminal pore on the slight curved styles. *Acorn* ovoid or globose, sometimes entirely enclosed in the cup; umbo is only visible. *Cup* with imbricate separate scales or combined in rings of ten reduced to mere lines. *Seed* 1.

- I. Male spikes stout, erect, simple or panicle; females on short distinct spikes or at the base of male spikes; involucre solitary or in groups of 3; cups hemispheric or ovoid; bracts imbricate. *Leaves* entire :—

Half or less of the mature nut enclosed by the cupule :—

Leaves quite glabrous on both surfaces :—

Glans ovoid, conic :—

Leaves lanceolate or oblanceolate. 1. *P. spicata*.

Glans sub-orbicular :—

Leaves ovate-lanceolate. .. 2. *P. polystachya*.

Leaves tomentose or pubescent beneath :—

Nut ovoid, conic, velvety. .. 3. *P. lappacea*.

More than half of the mature nut enclosed by the cupule :—

Glans hemispheric :—

Cupules always connate. *Leaves* lanceolate. 4. *P. pachyphylla*.

Cupules crowded, connate or solitary :—

Leaves glabrous, caudate; nut glabrous. 5. *P. fenestrata*.

Leaves minutely pubescent
(not caudate); nut hoary. ..

6. *P. dealbata*.

- II. Male spikes erect, stiff; involucre ovoid or globose enclosing the whole nut, marked on the outside with concentric belts or densely clothed with acuminate scales. Tips sometimes free. Leaves quite entire :—

Cupules tuberculate :—

Glans entirely covered by the involucre.

7. *P. xylocarpa*.

Glans apex not covered by the involucre.

8. *P. truncata*.

1. *Pasania spicata* (Smith) Chatterjee Com. Nov. Mss. (Syn. *Quercus spicata* Smith). Vern. *Dieng-sarang*, *Soh-rang-khlaw*, Synt.; *Dieng-sanam-dingim*, Khasi; *Jagtop*, Garo; *Temi-sakho*, Ass.; *Kading-sarang*, Mik.

A large or middle-sized tree (150' high); young shoots sometimes hairy. *Bark* grey, plain, .3 in. thick; blaze red with white vertical lines, turning deep-brown; cambium reticulated. *Leaves* 3-10 by 1-4 in., very variable, elliptic-oblong to obovate-oblong, sub-acute or bluntly acuminate, entire, coriaceous, shining, glabrous; lateral nerves 11-15 on either half; base acute, rounded or occasionally slightly cordate; petiole .2-.8 in. long. *Male spikes* usually in dense minutely tomentose terminal panicles or fascicles, a few being male flowers. *Male flowers* bracteolate; perianth-segments 6; stamens 10-12. *Female flowers* distinct or in glomerule of 3. *Ripe fruit* more or less confluent on a stout rachis. *Cupules* solitary or connate (2-3) saucer-shaped, enclosing only the lower portion of the glans, .7-.8 in. across; scales connate, slightly pubescent. *Glans* ovoid, conic, smooth, shining, often depressed.

K. & J. HILLS, SIBSAGAR, GARO HILLS, NAGA HILLS & KAMRUP, (upto 6,000 ft.).

Wood very hard, red; annual rings inconspicuous. Medullary rays broad and very fine, uniform and equidistant; silver grain conspicuous on radial section.

Used for building, fuel and charcoal.

Flrs. 4-5. Fr. 3-10.

The following more or less stable varieties are recorded from Assam.

1. Var. brevipetiolata A.DC. Vern. *Dieng-soh-sanam-dingem*, Khasi.

Petiole short. *Leaves* more or less obovate; base often slightly cordate. *Acorns* quite large, up to 1.5 in. in diameter.

KHASI HILLS.

Flrs. 4. Fr. 8-9.

2. Var. gracilipes Miquel.

Leaves lanceolate; base acute; petiole large (upto .9 in.). *Glans* not conical.

KHASI HILLS.

3. Var. microcalyx Blume.

Leaves small. *Acorns* small (under .5 in. in diameter). *Glans* with conical apex.

KHASI HILLS & GARO HILLS.

Flrs. 8. Fr. 12.

4. Var. Collettii King. Vern. *Dieng-long-krow*, Khasi.

Leaves lanceolate or oblanceolate, acute or acuminate. *Acorns* solitary. *Glans* ovoid, apiculate.

KHASI HILLS.

Flrs. 8. Fr. 12.

2. Pasania polystachya (Wall) Schottky.. (Syn. *Quercus polystachya*, Wall).

Young shoots of inflorescence minutely tomentose. *Leaves* 5-7 by 2-2.5 in., ovate-lanceolate, acuminate, entire, thinly coriaceous, smooth; lateral nerves 10-12 on either side; base acuminate, decurrent on the petiole; petiole .5-.7 in. long. *Male* and *Female* flowers in separate terminal panicles; female in distant glomerule of 3. *Ripe fruit* on short thick pitted rachis. *Cupules* serrate, connate. *Glans* sub-orbicular, smooth, shining, about .5 in. across and as long.

MANIPUR, (5,000 ft.).

Flrs. 2-4. Fr. 8-12.

3. *Pasania lappacea* (Roxb) Schottky. (Syn. *Quercus lappacea* Roxb.).

A small or middle-sized somewhat gregarious tree: branchlets rusty-pubescent. *Bark* grey, warty, fibrous; dark-brown inside. *Leaves* 4.9 by 1.5-2.7 in., oblong-lanceolate or oblanceolate, acuminate, entire, thinly coriaceous, glabrescent above but pubescent along the midrib and the nerves, puberulous beneath, more so along the nerves and midrib; lateral nerves 11-15 on either half; base acute or sub-acute, sometimes unequal and oblique; petiole .2-.4 in. long; stipules linear, caducous. *Spikes* solitary, axillary, androgynous, rusty tomentose. *Male flowers* in glomerule or solitary; perianth-segments 5-6. *Female flowers* solitary. *Cupule* sessile, hard, cup-shaped, enclosing about half the ripe glan, .8 in. across; tubercles imbricate, spreading. *Glans* ovoid-conic, apiculate, 1-2 in. long, softly pubescent.

CACHAR, KHASI HILLS, SYLHET & DARRANG, (upto 4,000 ft.).

Pores uniform, large. Medullary rays very numerous, very fine, uniform; no broad rays.

Female flowers 4-5. Male flowers 2-3. Ripe fruit 8.

4. *Pasania pachyphylla* (Kurz.) Schottky. (Syn. *Quercus pachyphylla* Kurz.)

Young shoots striate, puberulous. *Leaves* 4.5-7 by 1.5-1.75 in., oblong-lanceolate, rarely elliptic-acuminate or caudate-acuminate, entire, coriaceous, glabrous and shining above, uniformly covered with a coating of very minute stellate hairs beneath (except nerves and midrib); lateral nerves 8-9 on either half; base unequal, acute; petiole .35-.5 in. long, stout. *Spikes* solitary, axillary or terminal and fascicled; mostly male, a few androgynous. *Male flowers* glomerulate; perianth 5-6-toothed; stamens 10-12. *Female flowers* connate in groups of 3; stigma 3, erectopatent. *Fruiting spike* short. *Ripe cupules* crowded, connate into masses of 3 or 6, woody, hemispheric, 1-2 in. across (each). *Glans* depressed globose, glabrous, crowned by the remains of the united style, about 1 in. across.

DUFFLA HILLS & MANIPUR, (6,500-9,000 ft.).

Flrs. 6-7. Ripe fruit 1-3.

5. *Pasania fenestrata* Roxb. Chatterjee Comb. Nov. Mess. (Syn. *Quercus fenestrata* Roxb). Vern. *Ka-dieng-jing*, *Dieng-sai*, Khasi; *Dieng-sa-sei-saw*, Syn.

A middle-sized or large evergreen tree; young parts deciduously tawny-pubescent. *Bark* grey, rough, with cracks and irregularly shaped exfoliating woody scales, .5-.75 in. thick; inside reddish-brown, coarsely fibrous and spongy, granular. *Leaves* 4-7 by 1-2.5 in., oblong-lanceolate or elliptic-lanceolate, acuminate, entire, coriaceous, glabrous; lateral nerves 11-13 on either half, slender but prominent beneath; base cuneate, often oblique; petiole .3-.6 in. long; stipules linear-lanceolate, pilose. *Inflorescence* tomentose, crowded at the ends of branchlets, in panicles or fascicles bearing both male and female flowers. *Male flowers* in glomerules of 2-3, 3-bracteolate; perianth segments 5-6, tomentose outside; anthers about 12. *Female flowers* in glomerule of 3, one-bracteolate. *Cupule* almost enclosing the glans; scale, ovate, acute, connate at the base, pubescent; apex acute, incurved. *Glans* .6-.8 in. in diameter, smooth, globose, apiculate. *Ripe fruit* 1-2 (by abortion) or in threes.

CACHAR, SYLHET, GARO HILLS, K. & J. HILLS & NAGA HILLS, (upto 500 ft.).

A very variable species.

Heartwood red, hard; pores large. Medullary rays very fine, numerous, uniform and equidistant. Used for agricultural implements in Khasi Hills.

Flrs. 9-10. Fr. 4-5.

6. *Pasania dealbata* (Hk. f. & Th.) Chatterjee Comb. Nov. Mss. (Syn. *Quercus dealbata* Hk. f. & Th. Mss.) Vern. *Dieng-sai*, Khasi; *Soh-rang-khlaw*, Synt.

A small tree or shrub (10-25'/8"-18"). *Bark* ashy-grey, split in square flakes, light dun brown inside, coarsely granular, .3-.5 in. thick. *Leaves* 3-8 by 1-2.2 in., lanceolate, usually acuminate, entire, glabrous above when adult, more or less ashy-grey tomentose beneath; lateral nerves 8-14 on either half; tertiaries parallel and transverse; secondary nerves very fine; base acute or acuminate, often unequal; petiole .2-.7 in. long. *Inflorescence* terminal, the spikes

(often androgynous) in panicles. *Male flowers* sessile in clusters of 3; bracteoles unequal; perianth segments 6; stamens about 10. *Female flowers* in clusters of 3, confluent at base; styles 3; linear. *Cupule* sessile, woody, enclosing almost the whole of the glan; scales pubescent, connate with a free apex forming tubercles. *Glans* turbinate or pyriform, .5-.7 in. in diameter. *Ripe fruit* crowded on a stout long rachis or 1-3 together.

KHASI & JAINTIA HILLS, (upto 6,000 ft.).

Wood hard, reddish. Medullary rays of 2 classes, very broad with alternating numerous equidistant very fine ones. Good fuel.

Flrs. 1-2. Ripe fruit following cold season.

Var. Mannii—*Flower spikes* more slender. *Leaves* broadly lanceolate or ovate-lanceolate. *Ripe fruit* cylindric-oblong (not turbinate or pyriform).

KAMRUP (G. Mann). MANIPUR (C. B. Clarke).

7. Pasania xylocarpa (Kurz.) Schottky. (Syn. *Quercus xylocarpa* Kurz). Vern. *Amke-asing*, Abor.

A large tree. *Bark* whitish, plain, with vertical fissure and faint horizontal wrinkles; inside pale-brown, fibrous, soon turning darker-brown, soft, .6 in. thick. *Leaves* 4-7 by 1-1.75 in., elliptic-oblong or oblong-acuminate or caudate-acuminate, entire, thinly coriaceous, glabrous; lateral nerves 8-12 on either half, conspicuous; base acute or obtuse; petiole .3-.4 in. long. *Cupules* connate, enclosing entirely the glans, woody, spiny or tubercled. *Ripe fruits* (including the connate cupules) about 1.5 by 2 in..

N. E. F. TRACT, MANIPUR, NAGA HILLS & GARO HILLS, (upto 65,000 ft.).

Wood hard. Nuts are eaten raw or roasted.

Ripe fruit 12.

Pasania Milroyia A. Das com. Nov. (Syn. *Quercus Milroyii* Purkayasth Sp. Nov.) Vern. *Dabahingori*, Ass.; *Ta*, Abor.

A large evergreen tree attaining a girth of 6'-8"-10'. *Bark* greyish-white, thin, reticulate and marked with close set broad lenticels outside; inside marked with longitudinal

raised strands; young shoots villous. *Leaves* simple, alternate, 7·1-10·2 by 2·1-3·2 in., oblong-elliptic, sometimes lanceolate, entire, long acuminate, chartaceous, glabrate above, underneath puberulous along midrib; lateral nerves 11-12, prominent beneath and impressed on the upper surface, curving near the edge and anastomosing; base slightly decurrent on the petiole, at times oblique; petiole about ·3 in. long, pubescent. *Flowers* monœcious, male and female flowers in separate spikes. *Male flowers* in spikes crowded towards the tips of branches, bracteate; bract round to ovate, villous outside, glabrous inside, about ·04 in. across; flowers minute, about ·1 in. across; perianth segments 6; stamens up to 12; anthers joined at the tip, diverging below; filaments short; torus cottony. *Female spikes* erect, solitary, axillary 3·8 to 4·5 in. long, few flowered, each flower in a involucre of loosely packed fleshy pubescent scales when young; perianth segments short; staminodes few; ovary hairy; styles 3, hairy at the base; tip glabrous, recurved. *Mature fruit* generally solitary, ellipsoid with shallow depression at the top, 1·5 by 1·2 in.; involucre completely enveloping the nut, outside marked with scattered stout short more or less spirally arranged conical compressed tubercles sparsely distributed in the lower half but more or less crowded towards the tip. *Glan* ovoid-ellipsoid, truncated at tip, crowned by the remains of the style, about 1·2 by ·9 in..

N. E. F. TRACT, Pasighat Res. 500-700 ft.

Flrs. 10-11. Fr. 7-8.

Kew confirms this as a new species. There is some similarity with *Pasania xylocarpa* (Kurz) Schottky (*Quercus xylocarpa* Kurz) but in this case the leaves are bigger and their lower surfaces are not glaucescent; the cupules are generally solitary, elongate, ellipsoid instead of being depressed globose; the tubercles on the cupule-covering are less numerous, shorter and stouter; the apices of the tubercles are not produced into spreading or reflexed points.

8. *Pasania truncata* (King) Schottky. (Syn. *Quercus truncata* King).

A very handsome tree, glabrous (except inflorescence). *Leaves* 5-8 by 1·75-3 in., ovate-lanceolate to oblong-lanceolate, acuminate, entire, glabrous; lateral nerves 9-12 on either

half; base narrowed into the petiole (about .65 in. long). *Spikes* solitary, axillary or in small terminal panicles; female spikes few and below the male. *Male flowers* in glomerule of 4-8; each glomerule with long subulate bracteoles; perianth with blunt segments, tomentose outside; stamens 8-10. *Female flowers* in glomerule of 3 or more; style erect, sub-divergent. *Ripe fruit* on a stout pendulous lenticellate rachis. *Cupules* woody, sessile, sub-infundibuliform at first, afterwards sub-hemispheric. *Glans* depressed-ovoid, sericeous, enclosed in the cupule except the flat apex.

NAGA HILLS—Piphema, (2,000 ft.).

Pasania Listeri (King) Schottky (Syn. *Quercus Listeri* King). Vern. *Bakhu-Khorang*, Ass.; *Kotai*, Garo.

A large tree. *Bark* grey or darkish-grey, rough or warty, often with vertical lenticels, reddish-brown, fibrous. .25 in. thick; young branches puberulous. *Leaves* 4-13 by 3-5 in., elliptic-oblong or oblong-acuminate, entire, glabrous and shining above, minutely pubescent beneath; lateral nerves 12-14 (often up to 17) on either half, conspicuous below; base acute; petiole .7-1.3 in. long; stipules subulate, with fugacious glandular hairs. *Male flowers* in erect tomentose axillary and terminal panicles. *Female spikes* solitary, axillary. *Flowers* in glomerule of 3. *Cupules* completely enveloping the glans except the umbo, sometimes coalescing with 5-7 faint concentric belts which are obscurely crenate. *Ripe fruit* rather turbinate or ellipsoid, about 1.9 by 1.2 in.

LAKHIMPUR (Makum Range), MISHMI HILLS, DUFFLA HILLS & N. E. F. TRACT.

Medullary rays conspicuous. Wood cream coloured.

Flrs. Cold season. Ripe fruit following cold season.

3. CASTANOPSIS Spach.

Evergreen trees, rarely shrubs. *Male catkin* erect, mostly in terminal panicles. *Female* 1-3 in one involucre. *Nuts* wholly enclosed, covered with spines or tubercled. *Pith* usually quadrangular, medullary rays of most species uniform, very fine and equidistant (Brandis).

Fruit ovoid or globose, involucre dehiscent, spinous :—

Leaves sharply serrate.

..

.. 1. *C. indica*.

Leaves usually entire:—

Leaves serrate when young, often entire when adult:—

Walls of involucre concealed by subulate spines:—

Branchlets, petioles and under-side of leave pubescent or tomentose:—

Nerves 10-14 on either half. .. 2. *C. Hystrix*.

Branchlets, petioles and leaves glabrous or nearly so:—

Leaves lanceolate, elliptic-lanceolate or oblanceolate up to 8·5 in. long. 3. *C. argentea*.

Leaves ovate-oblong, up to 12" long (nut single). .. 4. *C. castanycarpa*.

Walls of involucre bearing spines in tufts but not completely concealed by them; spines in ridges:—

Leaves glabrous, entire. .. 5. *C. armata*.

Leaves cinereous or ferruginous, pubescent beneath, entire or serrate towards the apex. 6. *C. tribuloides*.

1. *Castanopsis indica* A. D. C. Vern. *Dieng-soh-ut*, *Dieng-ka-sut*, Khasi; *Sirang-asing*, Miri.; *Hinguri*, Ass.; *Amke-asing*, Abor; *Dhalne-katus*, Nep.; *Bandar-kakei*, Cach.; *Sareng*, Darrang; *Chakkum-chhokran*, *Chhakkhu-khokrak*, Garo; *Phongrong-arong*, Mik.; *Dieng-sarang*, Synt.; *Karachangne*, Duff.

A middle-sized or large tree (90'/80"). *Bark* greyish, warty, somewhat deeply fissured vertically, with exfoliating scales, .5 in. thick; blaze light-brown with interrupted tangential bands, fibrous, turning deep blackish-brown; young parts rusty-tomentose or pubescent. *Leaves* 3-7·5 by 1·3-3 in., elliptic-oblong or oblong-lanceolate, acute or acuminate, spinous-serrate, coriaceous, glabrous above, rusty-tomentose beneath; lateral nerves 14-20 on either half, conspicuous beneath, subparallel; midrib depressed above and pubescent; base rounded or obtuse, occasionally unequal sided; petiole .3-.5 in. long. *Male spikes* in lax panicles, longer than the leaves; stamens 12. *Female spikes* axillary, solitary. *Flowers* solitary. *Ripe involucre*s 1-1·5 in. in diameter, thin walled, densely covered with straight unequal radiating subulate pubescent spines, the longest about .5 in. long. *Nut* ovoid, .3 by .5 in.

Common throughout the province (upto 4,000 ft.).

Leaves are used for cigarettes and fruits are eaten.

Wood is used for handles of axes etc.

Flrs. 2-4. Fr. 10-12.

2. *Castanopsis Hystrix* A. DC. Vern. *Sirang-asing*, Miri.; *Sarang-baphang*, Cach.; *Bon-Belphoi*, Cach.; *Thangji*, Manip.; *Sethem*, Kuki; *Kata-singra*, Sylh.; *Arkhal*, Nep.; *Chaukhu*, Garo; *Dieng-stap-dih*, Khasi; *Phong-rong-arong*, Mik.

A large evergreen tree (100'/72''); young parts pubescent; stem often fluted. *Bark* plain, greyish, cinnamon-brown, with vertical lines of lenticels and horizontal wrinkles, .25 in. thick; inside fibrous and somewhat granular, light pinkish. *Leaves* 3-7 by 1-3 in., lanceolate or narrow-elliptic, acuminate, quite entire or sparingly toothed towards the apex, coriaceous, dark glossy green above, minutely scaly tomentose beneath; lateral nerves 7-9 on either half; base acute, obtuse or rounded, often unequal; petiole .3-.6 in. long. *Spikes* stout in small panicles; male spikes numerous; female few. *Female flowers* in threes; bracteoles pubescent, scarious. *Fruit* solitary, congested in spikes 1-2 in. long. *Involucre* often splits into 3-4 parts, exposing the glans; spines compound, often 3-fringed, pubescent, covering the whole surface, rather wiry, .1-25 in. long, often very sharp pointed. *Nuts* ovoid, conic, more or less 3 angled, about .5 in. long.

GARO HILLS, KHASI HILLS, N. C. HILLS, N. E. F. TRACT, LAKHIMPUR, SIBSAGAR, NOWGONG, DARRANG, GOALPARA & CACHAR, SYLHET.

Wood greyish, hard. Annual rings distinct. "Medullary rays very fine, numerous, uniform and equidistant with numerous short transverse bars forming concentric belts; weight 45-47 lbs. per c. ft."

Timber is used for building purposes and is also used for railway sleepers after treatment (creosote).

Flrs. 12-3. Fr. Following cold season.

3. *Castanopsis argentea* A. DC. Vern. *Dieng-la-muskei*, Khasi.

An evergreen tree 50'-60' tall, glabrous. *Bark* greyish. *Leaves* 4.5-8.5 by 1.5-2 in., lanceolate or oblong-lanceolate,

acuminate, thinly coriaceous, glabrous, pale beneath; lateral nerves 9-10 on either half, slender, arcuate; base acute; petiole 4-6 in. long. *Spikes* pubescent. *Female flowers* solitary. *Involucres* solitary and clustered, globose, tomentose; spines .5 in. long, pubescent, tufted on short woody stalks. *Nut* solitary, half adnate to the involucre.

Rongbyreng—KHASI HILLS, 4,000 ft. and NAGA HILLS, 6,000 ft.

Ripe fruit 5-7.

4. *Castanopsis castanycarpa* Spach.

Young shoots softly tomentose. *Leaves* 10-12 by 4-9.5, ovate-oblong of obovate-oblong, shortly acuminate, entire sub-coriaceous, shining and glabrous; lateral nerves about 10 on either half; reticulation minute; base acute; petiole stout, .5 in. long. *Female spikes* solitary, axillary, shorter than the leaves; the flowers solitary or in threes. *Ripe involucre* ovoid, 1.25 in. long, densely covered with straight flat sub-pubescent sharp weak spines (about .3 in. long). *Nut* single, ovoid.

MANIPUR & KHASI HILLS (?) No specimen in Forest Herbarium, Shillong.

Young fruit 8. Ripe fruit 12.

5. *Castanopsis armata* Spach. Vern. *Makhu-khorang-hingori*, *Horu-hingori*, Ass.; *Tang-asing*, Abor; *Kasning*, *Dieng-siar*, Khasi; *Choto-bangla*, Mech.

A middle-sized tree (65'/60''); young parts pubescent. *Bark* thin, greyish-brown, warty, irregularly and deeply cracked, pale-brown inside and fibrous, turning dark purplish brown. *Leaves* bifarious, 3-9 by 1-3 in., lanceolate or oblong-lanceolate, acuminate, entire, thinly coriaceous, shining above, pale beneath; lateral nerves 9-13 on either half, sub-parallel, arcuate at the margin, prominent beneath; base acute or obtuse; petiole .2-5 in. long. *Male spikes* erect, solitary or sub-panicled with the male spikes. *Female flowers* solitary. *Ripe fruit* ovoid, often depressed or flattened and elongated breadth-wise, about 1.5 in. across, thick walled, pubescent, spiny; spines in numerous groups (not

completely covering the wall), simple or branching, flattened, sharply apiculate. *Nut* solitary, ovoid but compressed or flattened.

GARO HILLS, K. & J. HILLS, SIBSAGAR, LAKHIMPUR & N. E. F. TRACT, (upto 3,000 ft.).

Medullary rays broad.

Flrs. 10-12. Fr. 8-12 (following year).

6. *Castanopsis tribuloides* A. DC. Vern. *Chaukoma*, Jhar.; *Bol-phalak*, Garo; *Sarong*, Kach.; *Dieng-soh-ut*, *Dieng-sning-long*, Khasi; *Chongom*, *Shething*, Kuki; *Thing Basi*, Tipp.; *Phul-hingori*, Ass.; *Bakhalai*, Darrang; *Harai-ching*, Naga.

A middle-sized, often large evergreen tree (80'/180''); young shoots more or less pubescent. *Bark* dark-grey, corky outside, .5 in. thick, uniformly very fibrous; inside light-brown, turning dark purplish-brown. *Leaves* 2-7 by 1-2.5 in., lanceolate, oblong-lanceolate or ovate-lanceolate, acuminate, entire, sometimes serrate towards the apex, rather coriaceous, glabrous above, purplish or reddish beneath, sometimes pubescent or with a thin coat of matted shining tomentum; lateral nerves 9-14 on either half; base acute; petiole .3-.7 in. long. *Male spikes* minutely tomentose, paniculate or fascicled. *Female spikes* solitary. *Flowers* solitary; involucre solitary or in pairs, tomentose; spines about .3 in. long, on short ridges, stellate or branched. *Ripe fruit* .7-1 in. in diameter. *Nuts* 1-3, glabrous; cotyledon ruminated.

GARO HILLS, CACHAR, SYLHET & SIBSAGAR.

Wood moderately hard with numerous fine uniform and equidistant medullary rays. Wood is sometimes used for planks etc. The fruit is eaten.

Flrs. 9-11. Fr. Following cold season.

Of the distinguishable forms, the following are recorded from Assam.

(1) **Var. *typica* King**:—Leaves entire, cinereously pubescent. *Spines* wiry, numerous, covering the walls of the involucre. *Nuts* usually solitary.

Common.

(2) **Var. ferox** King. Vern. *Chhakhu*, Garo; *Dieng-sning*, Khasi.

Bark sometimes cinnamon brown; blaze yellowish, turning brown, mottled with brown spots. *Leaves* usually entire (sometimes serrate). *Involucres* larger than (1), spines fewer and stouter. *Nuts* 1-3.

GARO HILLS, SIBSAGAR and K. & J. HILLS.

(3) **Var. Longispina** King. *Leaves* larger. *Spines* stout, short, often .5 in. long. *Nuts* 1-3.

KHASI HILLS.

(4) **Var. echinocarpa** King Pubescent, ferruginous. *Involucres* smaller than the typical forms and less covered by spines which are shorter and fewer and in horizontal belts or more or less in vertical rows. *Nut* solitary.

K. & J. HILLS.

(5) **Var. Wattii** King. Involucre small, thick and almost woody, densely covered with short branched often rufous spines. *Nuts* 2-3.

MANIPUR, KHASI HILLS.

4. CASTANEA Tourn. Sweet Chestnut.

Castanea sativa Miller.. Sweet chestnut.

A middle-sized deciduous tree. *Bark* ashy-grey, longitudinally furrowed. *Leaves* 4-8 by 1.5-2.5 in., oblong or elliptic, acuminate, sharply serrate, coriaceous, glabrous above, pubescent beneath; lateral nerves 13-20 on either half, very conspicuous beneath, sub-parallel; base rounded or obtuse; petiole .5-1 in. long. *Spikes* axillary, the lower male, the upper androgynous. *Male flowers* in dichasia of 3-7. *Female flowers* in group of 3 in one involucre. Ovary 6-celled; styles 6. *Nuts* 3, enclosed in the densely spinous involucre splitting into 2-4 valves.

Native of SOUTH EUROPE. Cultivated in Shillong for the fruits which are edible.

Long lived; growth rapid when young. Fairly good timber; medullary rays uniform, very fine; coppices well.

Flrs. Hot season. Fr. Autumn.

FAM. 130. BETULACEÆ.

Trees or shrubs, usually deciduous. *Leaves* alternate, usually undivided, as a rule serrate; stipules membranous, soon falling. *Flowers* monœcious. *Male flowers* in drooping catkins, united to the bract and may have a perianth; stamens 2-12; anther-cells as a rule distinct. *Female flowers* in long or short spikes, 2 or 3 in the axil of 1 or several bracts; perianth 0 or adnate to the ovary which is 2-celled; ovule one in each cell, pendulous; style 2, filiform. *Fruit* usually a one seeded-nut; bracts and bracteoles enlarged in fruit into a scale or cup-like organ, often remaining attached to the fruit. *Seeds* exalbuminous; radicle superior.

Male flowers solitary, naked on bract :—

Bracts greatly enlarged in fruit; nut small, adnate to the base of a large reticulate wing-like bract.

1. Carpinus.

Male flowers (with perianth) in dichasium :—

Stamens not bifid :—

Bracts of the fruiting spike forming the fruit resembling a cone.

2. Alnus.

Stamens bifid :—

Bracts of the fruiting spike not forming the fruit resembling a cone, but accrescent in fruit forming 2 small membranous wings to the nut.

3. Betula.

1. CARPINUS Tourn.

***Carpinus viminea* Wall.**

A middle-sized tree; stem irregularly fluted; bark grey, with darker streaks; branches verrucose. *Leaves* 3-4 by 1-2 in., ovate-lanceolate, caudate-acuminate, doubly serrate, membranous, glabrous; lateral nerves prominent, 10-12 on either half, parallel; base rounded or sub-cordate; petiole .1-.5 in. long, hairy. *Male* spikes 1-2 in. long; bracts ribbed, shining, ciliate; anther-cells with a tuft of long hairs at the apex. *Female* spikes 2-4 in. long; bracts 1 in.

long, lanceolate, unequal-sided, serrate on the broader side, often lobed at the base. *Nut* .1-.15 in. long, glandular.

KHASI HILLS.

Wood white, moderately hard; weight 50 lbs. per c.ft.

Flrs. 1-4. Fr. 6-7.

2. ALNUS Gærtn.

***Alnus nepalensis* D. Don.**

A large deciduous tree; bark compact, silvery-grey; branchlets glabrous; young shoots usually pubescent. *Leaves* alternate, 2.5-7 by 1.5-3.5 in., elliptic or elliptic-lanceolate, acute, entire or somewhat denticulate, coriaceous, glabrous above, slightly pubescent along the nerves beneath when young, usually glaucescent and dotted with resinous minute dots; lateral nerves 10-18 on either half; base narrowed or rounded; petiole .3-.8 in. long. *Male catkins* 4-10 in. long, terminal, drooping, paniced; flowers supported by bracts and bracteoles; bracts 3-flowered with usually 4 bracteoles adnate to each bract; sepals 4; stamens 4; anther-cells connate. *Female spikes* .2-.3 in. long, erect. *Cones* (fruiting spikes) .5-9 by .3 in ovoid or cylindrical, in lateral panicles. *Nut* with membranous somewhat irregular wing, remaining long on the tree.

UPPER ASSAM, MISHMI HILLS, AKA HILLS & KHASI HILLS, (upto 9,000 ft.).

The bark is used with *Rubia* for dyeing to deepen the colour.

Flrs. 10-12. Fr. 2-3 (remains long on the tree).

3. BETULA Tourn.

Deciduous trees or shrubs; outer bark papery, peeling off in horizontal flakes. *Leaves* penninerved, toothed or serrate, acute or acuminate; stipules deciduous. *Flowers* monœcious. *Male flowers* in pendulous catkins; bracts stalked, peltate, bearing on the inner face 2-3 bracteolate flowers; sepals 2-4; stamens 2; filaments forked, separating the anther-cells. *Female flowers* in erect or drooping spikes; bracts imbricate, each with 2 bracteoles on either side; perianth 0. *Ovary* 2-celled, compressed; ovules 1 in each cell;

style 2, slender; stigma terminal. *Fruiting spike* of deciduous 3-lobed scales and winged or margined nuts.

Lateral nerves 10-15 on either half :—

Nut with wings broader than itself :—

Wood white. 1. *B. alnoides*.

Lateral nerves 6-10 on either half :—

Nut with scale-like margin :—

Wood reddish brown. 2. *B. cylindrostachys*.

1. *Betula alnoides* Ham. Vern. *Dieng-ling*, Khasi, Synt.; *Khengjau*, Kuki; *Bhojpotra*, Cach.; *Dieng-ling-arong*, Mik.; *Teria-ching*, Naga.

A moderate-sized tree, often gregarious; bark lenticellate, peeling off horizontally in somewhat narrow rolls; outside grey or brownish with thin layers of papery cork and white underneath the corky layers; inside light-brown, turning darker, granular, .5 in. thick; young parts pubescent or tomentose. *Leaves* 2.5 by 1-2.5 in., ovate to lanceolate, acuminate, very irregularly doubly cuspidate-serrate, sub-coriaceous, pubescent beneath when young, dotted with resinous scales when mature; lateral nerves 10-15 on either half; base rounded or sub-cordate; petiole .2-.8 in. long, hairy; stipules .3 in. long, lanceolate. *Male catkins* 2.5 in. long; bracts, stamens and ovary hairy. *Female spike* about the same size usually fascicled. *Fruiting spike* often up to 3 in. long. *Fruit* broader than the bracts; wings broader than the nut.

N. E. F. TRACT, GARO HILLS, CACHAR, N. C. HILLS, MANIPUR and K. & J. HILLS, (upto 5,000 ft.).

The wood is white, fairly close grained. Weight 41 lbs. per c.ft. Probably will be useful for manufacture of ply woods.

Flrs. 4-5. Fr. Rainy season.

2. *Betula cylindrostachys* Gauleb. Vern. *Bolgakkel*, *Bol-nangal*, Garo; *Dieng-ling*, Khasi.

A very large and lofty tree (100'/100''); bark grey, exfoliating in large papery flakes which often overhang; inside reddish-brown, .3 in. thick, mottled with coarse fibres (sap has a strong castor oil like smell); crown spreading (60' diameter); twigs dark, purplish-brown, strongly speckled white. *Leaves* 2-6 by .8-3 in., ovate, lanceolate, acute or

acuminate, doubly serrate, coriaceous, glabrous above, dotted beneath; lateral nerves 6-10 on either half, with elegant reticulations; base rounded or obtuse; petiole .5-1 in. long. *Male flowers* in dense catkins 3-6 in. long. *Fruiting spikes* panicled, 3-4 in. long. *Fruit* scale-like, .05 in. broad with 2 membranous winged margin.

GARO HILLS, KHASI HILLS & NAGA HILLS, (upto 4,600 ft.).

Wood reddish-brown, heavy, very hard; medullary rays all more or less of same thickness, very close, straight, parallel; pore is of diameter equal to or slightly less than the space between 2 contiguous medullary rays, scanty, uniformly scattered; annual rings indistinct. Should be quite suitable for manufacture of ply wood. (Fruit also eaten).

Flrs. & Fr. 3-6.

FAM. 131. SALICACEÆ.

Trees or shrubs, deciduous, fast growing, with much vegetative reproduction by suckers; almost always diœcious; buds scaly. *Leaves* alternate, simple, stipulate. *Flowers* naked, in catkins or spikes, each on the axil of a bract; bracteole 0. *Perianth* 0; disc of 1 or more glands or cup-shaped. *Male flowers* stamens 2-30. *Female flowers* ovary sessile or stipitate, usually of 2 carpels (rarely 3), 1-celled; placenta parietal; ovules many, anatropous. *Fruit* capsular, 2-4 valved. *Seeds* many, minute, exalbuminous, with a basal tuft of long silky deciduous hairs; embryo straight; cotyledons plano-convex; radicle short, inferior.

Disc of 1 or 2 separate glands :—

Stamens usually 2 (upto 12) :—

Fruit 2-valved :—

Petiole short. 1. **Salix.**

Disc annular or cupular :—

Stamens usually more than 2 (numerous) :—

Fruit 2-4-valved :—

Petiole long. 2. **Populus.**

SALIX Linn.

Deciduous trees or shrubs. *Leaves* alternate (rarely opposite), usually narrow lanceolate, ovate or elliptic;

petioles short; stipules various. *Bracts* entire. *Disc* usually of 1 or 2 glands. *Stamens* 2-12; filaments long, filiform. The valves of capsule usually rolled back when ripe.

Stamens 5-10 :—

Capsule glabrous or puberulous. .. 1. *S. tetrasperma*.

Stamens 6-8 :—

Capsule densely woolly. .. 2. *S. ichnostachya*.

Stamens 2 :—

Capsule woolly. .. 3. *S. psilostigma*.

1. *Salix tetrasperma* Roxb. Vern. *Seemir-asing*, Miri.; *Pani-hijal*, Sylh.; *Bhe*, Ass.; *Besbiphang*, Mech.; *Bol-slak*, Garo; *Jamynrei*, Khasi; *Dieng-um*, Synt.

A middle-sized tree. *Bark* dark-grey or dark-brown, deeply and vertically furrowed, .3-.5 in. thick; blaze light-red, fibrous; young parts silky. *Leaves* 1.5-6 by .6-2.2 in., lanceolate, ovate-lanceolate or oblanceolate, acuminate, cuspidate, serrulate, rarely entire, sub-coriaceous, glabrescent above, glaucous beneath; lateral nerves many, conspicuous; petiole .2-1 in. long; stipules caducous, prominent in young shoots. *Male catkins* 2-4 in. long. *Female catkins* 3-5 in. long; disc glands fleshy, yellowish; stigma 2-branched. *Capsule* .15-.2 in. long, on slender stalk (of nearly the same length), in groups of 3-4. *Seeds* 4-6.

Common throughout the province on river banks and low lying moist places, often gregarious. Wood whitish, 53 lbs. per c.ft. Wood is used for ploughs and planks. Recently tried successfully in match industry. Leaves are cattle fodder. Twigs are used for basket making.

Flrs. Autumn. Fr. Cold weather (sometimes flowers in hot weather).

2. *Salix ichnostachya* Lindl.

A middle-sized tree; young parts silky-pubescent. *Leaves* 1-2.6 by .3-.8 in., lanceolate or ovate-lanceolate, acuminate, serrate, usually glaucous beneath; base acute, lateral nerves 10-14 on either half, not very distinct; petiole .3-.5 in. long. *Catkins* densely woolly; male laxly flowered;

female densely flowered. *Stamens* 6-8. *Style* short, 2-fid. *Capsule* nearly sessile, globose ovoid, densely woolly.

ASSAM (D. Chatterjee).

Flrs. Rainy season. Fr. 10-11.

3. *Salix psilostigma* Anders. Syn. *Salix eriophylla* Anders. Vern. *Dieng-jiamon-Roy*, Kh.

A spreading shrub. *Bark* blackish, smooth. *Leaves* 1.3-4.3 by .3-1 in., lanceolate, acute or acuminate, entire, serrate or obscurely crenate, coriaceous, glabrescent and dull green above, densely white tomentose beneath; lateral nerves impressed above; base rounded or sub-cordate; petiole .05-.2 in. long; stipules sub-cordate. *Bracts* densely villous. *Stamens* 2; anthers yellowish. *Capsule* .1 in long, sessile.

Common throughout K. & J. HILLS. (upto 6,400 ft.).

Flrs. 3-4. Fr. 7-8.

***Salix babylonica* Linn.**—The *Weeping Willow*, sometimes cultivated in garden.

2. POPLUS Linn.

***Populus ciliata* Wall.** The Himalayan Poplar.

A lofty tree; bark grey, smooth on young plants, vertically wrinkled or fissured on old stem; buds viscid, lanceolate. *Leaves* 3-7 by 2.5-.5 in., broadly ovate, acuminate, finely dentate, glandular ciliate (margin), glabrous; base cordate, 3-5 nerved; lateral nerves 4-5 on either half (above the basal), irregularly forked; petiole 2-5 in. long, compressed above. *Flowers* in lateral catkins (before the appearance of new leaves). *Male catkins* 2-4 in. long, somewhat interrupted; stamens numerous; filaments short, slender. *Female catkins* 6-9 in. long, lax (in fruit); disc toothed, embracing half the ovary; bracts caducous; stigma 3-4, sub-sessile, obcordate. *Capsule* .3-.5 in. long, 3-4 valved, ovoid; stipes and hairs of the seeds as long as the capsules.

AKA HILLS, (Dr. N. L. Bor). Cultivated in Shillong (K. & J. Hills).

Flrs. Hot season. Fr. 5-6.

GYMNOSPERMS.

FAM. 132. GNETACEÆ.

Trees or shrubs, erect or climbing; stem and branches articulated. *Leaves* opposite, large and green or reduced and scale-like, exstipulate. *Flowers* unisexual, diœcious, numerous, in axillary or terminal spikes or cones. *Male flowers* tubular of 2-4 sepals; anthers 2-8, sub-globose, 1-3-celled, sessile or sub-sessile in the column of the united filaments. *Female flowers* ovule one, erect, with 2 or 3 integuments of which one is produced into a tube with discoid mouth and functions of a style. *Seeds* dry or drupaceous; albumen copious or scanty; embryo straight; cotyledons adpressed; radicle long, superior. *Resin* ducts absent; vessels present in the secondary wood.

(I have followed Dr. Fr. Markgraf: Monographie der Gattung Gnemon in Bulletin Jard. Bot. Buitenzorg Sec. III, Vol. X, Levr. 4).

GNETUM Linn.

Mostly evergreen climbing shrubs, a few erect or small trees. *Leaves* decussate, entire, leathery. *Flowers* usually diœcious (in spikes which are more usually grouped into more complex inflorescence) whorled in the axils of cup-shaped bracts, usually surrounded by jointed hairs. *Male flowers* perianth narrowly clavate, entire or valvately 2-fid; anthers 2, sessile, 1-locular, opening by terminal slits. *Female flowers* perianth tubular; ovule erect, solitary, orthotropous with 2 integuments, the inner integument projecting as a slender exserted tube with the functions of a style, often toothed or fimbriate, ultimately after fertilization the perianth becoming fleshy, outer integument woody forming a drupaceous fruit.

Ovary and fruit sessile, tree.	..	..	1. <i>G. Gnemon.</i>
Ovary and fruit stipitate, climber.	..	..	2. <i>G. montanum.</i>

1. Gnetum Gnemon Linn. Vern. *Han-thu*, Mik.; *Annel*, Lush., Kuki; *Mejherguti*, Ass.

An ever green shrub or a small tree, sometimes middle-sized. *Bark* greenish (young stem green) .1 in. thick, green below the cuticle; blaze green, exuding watery juice; wood cream coloured. *Leaves* 2.5-9.5 by 1.3.5 in., elliptic-lanceolate or elliptic-oblong, acuminate, entire, rather coriaceous, glabrous, glossy green above, paler beneath; lateral nerves 8-12 on either half, arcuate, running into an intra-marginal nerve, somewhat away from the margin; base acute; petiole .2-.6 in. long. *Male spikes* 1-1.5 in long, slender. *Female spikes* about 1 in. long, often branched; rachis thicker; cupular bract acuminate, distant. *Fruit* oblong, apiculate, .5-.7 in. long, reddish when ripe.

SIBSAGAR, MANIPUR, CACHAR, DARRANG and K. & J. HILLS.

Flrs. 2-4. Fr. Rainy season.

Markgraf has subdivided this species into several varieties of which the following are represented in Assam :—

Var. Brunonianum (Griff) MG.F.

Shrub. *Inflorescence* mainly simple, long, lax. *Female flowers* sterile, globose, shortly and obtusely apiculate. *Fruit* oblong, entirely punctate.

DARRANG, NAGA HILLS, CACHAR & LUSHAI HILLS. (U. N. Kanjilal's, No. 3741).

Male flrs. 1-2. Female filrs. 4.

Var. Griffithii (Parlat) MG.F.

Shrub. *Inflorescence* mainly short, often with ramification, always contracted. *Fruit* sub-globose, evenly granulose.

SIBSAGAR (Barpathar) & NAGA HILLS. (U. N. Kanjilal's No. 3885).

2. Gnetum montanum MG. F. Nom. Nov. (*Gnetum scandens* Roxb.) Vern. *Jeging-riubi*, Miri; *Mameilet*, Ass.; *Thanlping-rhui*, Lushai, Tipp.; *Mei-lar-iong-um*, Khasi; *Jermai-saprah*, Synt.

A large evergreen climber; stem woody. *Bark* dark-grey, corky, about .3 in. thick, peeling off in pieces; blaze brownish. *Leaves* opposite, 3-8 by 2-5 in., elliptic or ovate-

oblong, bluntly acuminate, entire, sub-coriaceous, glabrous, glossy; lateral nerves 8-12 on either half, arcuate, slender, prominent below; base cuneate or rounded; petiole .3-.8 in. long. *Flowers* diœcious, in rigid paniced spikes; bracts of males closely imbricate, those of females interrupted. *Fruiting spikes* 3-10 in. long. *Fruit* drupaceous, stipitate, ellipsoid, .75-1.5 in. long, reddish-orange when ripe (not apiculate).

Common throughout the province.
Fruits are edible.

Flrs. 2-4. Fr. Cold season.

Forma megalocarpium *MG.F. n.f.*

Leaves large. *Fruit* 1.2 in. long, .7 in. broad; stalk .32 in. long.
DUFFLA HILLS, (Lister).

FAM. 133. TAXACEÆ.

Trees or shrubs. *Leaves* mostly narrow, linear or lanceolate. *Flowers* mostly diœcious. *Pollen* sacs born on the undersurface of the sporophylls which are scale-like. *Carpels* usually few or even 1, terminal, with 1-2 ovules each. *Seeds* projecting beyond carpels or even naked, with fleshy aril or drupaceous testa; cone formation imperfect. *Seeds* 1 or few, not connected by the scale.

Pollen grains winged. Seed erect or partially inverted :—

Ovuliferous scale completely curved into itself. Carpels small.

1. **Podocarpus.**

Pollen grains not winged. Seed inverted :—

Female flowers usually single, only one of pair developed :—

Ovules erect, solitary.

2. **Taxus.**

Female flowers of several decussate carpels :—

Ovules erect in pairs.

3. **Cephalotaxus.**

1. **PODOCARPUS** L'Herit.

Evergreen trees or shrubs. *Leaves* variable, linear-lanceolate or elliptic or dimorphic, some scale-like and imbricate, others distichous linear or subulate on the same branch. *Flowers* monœcious or diœcious. *Male flowers* solitary, fascicled or spicate, with imbricate bracts; antheriferous scales numerous, imbricate, cells 2 on the under side; connective clawed or appendaged at the apex; pollen-grains winged. *Female flowers* usually solitary, pedunculate; spicate bracts large; ovules reflexed on a stalk consisting of connate bract and scale. *Seeds* small, globose or ovoid, seated on the enlarged fleshy stalk; testa hard, often fleshy externally; albumen fleshy; cotyledons 2.

Leaves linear, midrib quite distinct on both surfaces. Seeds .2-.3 in. across.

.. 1. *P. neriifolia*.

Leaves lanceolate or elliptic-oblong, midrib obsolete. Seeds .6-1 in. across.

.. 2. *P. latifolia*.

1. Podocarpus neriifolia D. Don. Vern. *Kat-bhaluka*, Ass.; *Dieng-sia-Blei*, Khasi; *Jinari*, Cach.; *Thlang-phar*, Lush.; *Kherewal-tak*; Kuki. *Dieng-kse-um*, Synt.

A tall tree 40-60 ft. high, glabrous; branches whorled. *Bark* light cinnamon brown, peeling off in long papery flakes, .16 in. thick, reddish and finely fibrous inside. *Leaves* scattered, 4-10 by .4-.8 in., linear-elongate, lanceolate, acuminate, entire, thickly leathery, glabrous; midrib very prominent on both surfaces; longitudinal nerves rather obscure; base cuneate; petiole .1-.3 in. long. *Male flowers* in clusters or spicate. *Seeds* solitary, globose, .6-.7 by .3-.5 in., bluish-black when ripe; enlarged fleshy peduncle about .4 in. long.

N. E. F. TRACT, LAKHIMPUR, CACHAR, K. & J. HILLS & SIBSAGAR. (upto 4,000 ft.)

Wood yellowish, even grained. Annual rings rather faint; medullary rays numerous, very fine. Weight 38 lbs. per c. ft.

A timber of some importance in Surma Valley, highly prized in Burma.

Flrs. Rainy season. Fr. Cold season.

2. Podocarpus latifolia Wall. Vern. *Thing-Raman*, Kuki.

A large evergreen tree. *Leaves* opposite or nearly so, 3·5-7 by ·8-2·5 in., lanceolate or elliptic-oblong, acuminate, entire, coriaceous, glabrous, longitudinal nerves numerous, very slender; midrib obsolete; base rounded, narrowed into a short petiole (·1 in. long). *Male flowers* in clusters; antheriferous scales ovate, acuminate. *Seeds* solitary, ·6-1 in. across, seated on a fleshy enlarged peduncle.

CACHAR and K. & J. HILLS, (5,000 ft.).

Wood grey, slightly aromatic, even grained, moderately hard. Annual rings rather obscure, medullary rays very fine, numerous.

Flrs. Rainy season. Fr. Cold season.

P. Wallichianus C. Presl. Vern. *Thing-romao*, Lush. Apparently quite a small tree. *Leaves* like bamboos, 4-5·5 by 1-2 in., acuminate.

Barak Reserve (CACHAR) Sheet No. 4795. It appears to be *P. latifolia* Wallich, and I agree with Dallimore and Jackson in reducing *P. latifolia* of Wallich. to *P. Wallichianus* C. Presl.

2. TAXUS Tourn.

Taxus baccata Linn. Vern. *Soh-Blei*, *Dieng-Blei*, Khasi.

A slow-growing, small or medium sized evergreen tree; stem fluted, crown spreading. *Bark* greyish-brown, softly corky, peeling off in longitudinal thin shreds; inside light-pink with thin fibrous plates. *Leaves* distichous, 1-1·5 by ·1 in., linear, flattened, often cuspidate-acuminate, dark-green and shining above, pale yellowish-brown or rusty beneath, with obscure stomatic lines; 1-nerved; base narrowed into a short petiole. *Flowers* usually diœcious. *Male flowers* pedicelled, sub-globose; scales peltate, numerous, each bearing on the underside 3-6 anther-cells dehiscing longitudinally. *Female flowers* solitary, axillary, consisting of a few imbricating scales, round an erect ovule situated on a membranous cup-shaped disk enlarged bright red and succulent in fruit only the tip being exposed. *Seeds* compressed, wingless, olive-green; testa woody; cotyledons 2.

KHASI HILLS, MISHMI HILLS & BALIPARA FRONTIER TRACT. (Piri upto 10,000 ft.).

Sap-wood white; heart-wood orange-red; close grained, elastic, hard, takes a fine polish. Annual rings very fine, very numerous. Weight 44 lbs. per c. ft., immensely suitable for cabinet work.

Flrs. 3-5. Fr. 9-11 (ripening in the following year).

3. CEPHALOTAXUS Sub et Zucc.

Evergreen trees or shrubs; all shoots of unlimited growth. *Leaves* alternate, spirally arranged and spreading on vertical shoots, distichous on lateral shoots, linear, flat, pointed, shining, green above, usually with 2 silvery bands beneath composed of many stomatic lines, a large resin canal near the underside between epidermis and fibro vascular bundle of the midrib; midrib conspicuous. *Flowers* diœcious. *Male flowers* in axillary globose heads, 6-11 flowered, supported by a small involucre of imbricating scales; bracts membranous, one flowered. *Stamens* 7-12; scale stipitate bearing on its back 2-3 anther sacs; pollen grains globose. *Female flowers* small in stalked cones, several in the axil of bracts at the base of terminal shoots which lengthen out after fertilization; scales many on the fleshy axis of the cone, each bearing 2 ovules at the base, one of which only develops, scales become fleshy and often connate at a later stage and the seeds then appear to become enclosed in fleshy cups. *Seeds* large, drupaceous, with fleshy aril; cotyledons 2.

Leaves narrowed towards the base, pale green beneath. 1. *C. Mannii*.

Leaves with a broad rounded base, whitish beneath. 2. *C. Griffithii*.

1. *Cephalotaxus Mannii* Hk. f.

A small tree. *Bark* cinnamon-brown. *Leaves* 1-2·2 by ·1·15 in., linear, sub-falcate, gradually narrowed from the base, apiculate, pale green beneath; midrib more prominent above; base acute or obtuse. *Anthers* about 12, mucronate. *Female cones* 3-4, on a common peduncle; bracts adnate, ovate, obtuse. *Seeds* 1·25-1·5 in. long, obovoid, narrowed at the base, with a short apical point.

KHASI & JAINTIA HILLS and NAGA HILLS, (4,500-8,500 ft.).
Flrs. 3-5. Mature fruit. 3-7 (following year).

2. *Cephalotaxus Griffithii* Hook. f.

A middle-sized tree; branches elongate. *Bark* brownish, smooth. *Leaves* 1-1·5 by ·1-·15 in., more or less falcate, sub-acute, patent or almost so; base partially inequilateral, truncately rotundate or partly sub-cordately incised, often attenuate, whitish beneath; midrib more prominent above. *Seeds* ·8-·9 in. long, sometimes longer, born 3-4 together with a short apical point and narrowed at the base.

NORTH EAST FRONTIER TRACT, NAGA HILLS, MANIPUR & MISHMI HILLS, (5,000-6,000 ft.)

FAM. 134. PINACEÆ.

Trees or shrubs, mostly evergreen. *Leaves* usually needle-like or scaly. *Flowers* mostly monœcious. *Male flowers* in deciduous catkins consisting of numerous sporophylls which are usually scale-like and bears 2-6 (rarely less or more) pollen sacs on the lower surface. *Female flowers* in cones consisting of scale-like open carpels which are flat or peltate and bear directly or on a subsidiary placental scale 1-many ovules. *Seeds* concealed between scales of a perfect cone; testa woody or leathery (no aril).

The wood is without vessels. Resin canals are present. It consists of long thick-walled tracheids arranged in radial lines with large bordered pits.

Cones perfect. Seeds concealed between scales, no aril :—

- (i) Leaves spirally arranged; carpels simple with 1 reversed ovule in the centre.
Seeds adherent to scales 1. *Araucaria*.
- (ii) Leaves spirally arranged; ovules reversed; scales of cones numerous, spirally arranged:—

Pollen grains winged:—

Long shoots only present:—

Needles 4-angled. Cones pendulous; scale persistent. .. 2. *Picea*.

Needles flat. Cones upright, scales deciduous. .. 3. *Abies*.

Long and short shoots both present:—

Long shoots with scaly leaves, short shoots with green needles. 4. *Pinus*.

Needles on both shoots. .. 5. *Cedrus*.

Pollen grains not winged:—

Needles flat. Cones pendulous, scales persistent. .. 6. *Tsuga*.

(iii) Leaves spirally arranged; ovules erect; scales rudimentary or weakly developed:—

Long shoots only present; carpels with toothed scale. .. 7. *Cryptomeria*.

(iv) Leaves opposite or whorled, rarely alternate, often heterophyllous; ovules erect; scales of cones few:—

Cones woody when ripe; carpels peltate. Seeds with orbicular wing. 8. *Cupressus*.

Cone baccate or drupaceous. Seeds not winged. .. 9. *Juniperus*.

1. ARAUCARIA Juss.

Araucaria excelsa R. Br. (Norfolk Island Pine).

A handsome tree with graceful feathery branches; main branches horizontal, whorled; lateral branchlets horizontal or pendulous; outer bark peeling off in thin flakes. *Leaves* dimorphic, needle-like, incurved, bright green on young or lateral branchlets (.5 in. long), broadly ovate and overlapping, on older branchlets (.25 in. long). *Cones* 3-4 by 3.5-4.5 in.. *Seed* 1.1-2 by .2-.3 in.

A native of NORFOLK ISLAND. Sometimes cultivated.

2. PICEA Link.

Picea Smithina Boiss. Syn. *Picea Morinda* Link. The Himalayan Spruce.

A tall stately tree, reaching a height of 200 ft. and a girth of 20 ft. *Bark* greyish, shallowly furrowed, and with

orbicular or squarish scales. *Leaves* spirally arranged, 1-1.5 in. long, pungent, 4-sided with about 2 lines of stomata on each. *Male catkins* solitary, erect, 1 in. long. *Stamens* with 2-linear pollen sacs. *Cones* 4-7 by 1-2 in., pendulous, bright-green when young, brownish when ripe; scales persistent. *Seeds* about .2 in. long; wing spatulate, .5-.6 in. long; cotyledons 5-8.

Cultivated in Shillong.

Flrs. 4. Cones ripe 10-11.

3. ABIES Juss.

***Abies Webbiana* Lindl.** The East Himalayan Silver fir.

An enormous lofty tree (150-200'/20-30'); branches pendulous. *Bark* dark-brown or greyish-black, deeply fissured. *Leaves* .5-2 in. long, distichous, needle-like, flattened, all round the branchlets. *Flowers* monœcious. *Male catkins* clustered; stamens with 2 linear pollen sacs. *Cones* erect; scales thin, breaking away from a persistent woody axis when ripe, fan-shaped, suddenly contracted to a short claw; ovules recurved in the axils. *Ripe cones* cylindric, thicker and shorter than *A. Pindrow* (4-7 by 1.5-3); wing $1\frac{1}{2}$ times the length of the seed.

Flrs. 4. Cones ripen in 9-10.

BALIPARA FRONTIER TRACT (Common on Piri mountains 10,000 ft.) (Dr. N. L. Bor).

A. Delavayi

A tall tree (60-100 ft. high); young shoots reddish-brown. *Leaves* about 1 in. long (arranged as in *A. Webbiana* but shorter) dark glossy-green and furrowed above; midrib prominent beneath with 2 broad white bands of stomata; margins somewhat revolute. *Cones* 3-4 in. long, barrel-shaped, dark violet-black; in ripe cone the apex of the scale is slightly exserted.

BALIPARA FRONTIER TRACT, Piri Mountain—10,000 ft. (Dr. N. L. Bor).

4. PINUS Linn.

Evergreen trees; branches whorled; shoots dimorphic (long and short). *Leaves* needle-like or scaly. *Flowers*

monoecious; perianth 0. *Male catkin* crowded at the base of the current year's shoots, numerous, each bearing 2 pollen sacs connected at the back by a scale-like connective which is produced in a membranous tip. *Female flowers* in cones, solitary or whorled; scales double; the lower (carpellary), small, disappearing in fruit; the upper (placental) bearing near its base 2 reversed ovules and becoming hard and woody in fruit. *Ripe cones* ovoid-oblong or cylindrical, formed from the imbricating woody or almost leathery placental scales. *Seeds* generally winged, oily; cotyledons more than 2.

Needles in bundles of 3 :—

Leaves 6-10. long; cones ovoid, 2-3 in. long. 1. *P. Khasya*.

Leaves 9-15 in. long; cones ovoid, 4-8 in. long. 2. *P. longifolia*.

Needles in bundles of 5 :—

Cones 6-12 in. long, cylindrical. .. 3. *P. excelsa*.

1. *Pinus Khasya* Royle. Vern. *Dieng-se, Dieng-kysi*, Khasi; *Saral*, Beng.

A tall gregarious tree (150'); branches whorled. *Bark* thick, deeply and reticulately cracked, coming off in thick small plates. *Needles* 6-10 in. long, slender, back convex; sheath persistent, grey, lacerated at apex. *Cones* ovoid, solitary or in twos or threes, 2-3 in. long, about 2 in. across (beak of scale depressed) pyramidal with a blunt knob at the end; wings four times the length of the seed.

MANIPUR, NAGA HILLS and K. & J. HILLS, (upto 6,000 ft.).

Principal building timber of Khasi and Jaintia Hills. The resin can be distilled into a high class turpentine. The highly resinous heartwood is an excellent torch wood.

Flrs. 2-3. Cones ripen in about 2 years, persist long on the trees.

2. *Pinus longifolia* Roxb.

A tall gregarious tree; branches whorled. *Bark* 1-2 in. thick, deeply fissured into large plates which fall off. *Leaves* 9-15 in. long, slender, obscurely triquetrous. *Cones* solitary or 3-5 together, ovoid. 4-8 in. by 3-5 in., on short stalks. *Scales* 1-2 by .7 in.; beak 4-6-gonous, reflexed, much thickened, usually with a somewhat recurved pointed tip. *Seeds*

KHASI & JAINTIA HILLS and NAGA HILLS, (4,500-8,500 ft.).
Flrs. 3-5. Mature fruit. 3-7 (following year).

2. *Cephalotaxus Griffithii* Hook. f.

A middle-sized tree; branches elongate. *Bark* brownish, smooth. *Leaves* 1-1·5 by ·1-·15 in., more or less falcate, sub-acute, patent or almost so; base partially inequilateral, truncately rotundate or partly sub-cordately incised, often attenuate, whitish beneath; midrib more prominent above. *Seeds* ·8-·9 in. long, sometimes longer, born 3-4 together with a short apical point and narrowed at the base.

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Trees or shrubs, mostly evergreen. *Leaves* usually needle-like or scaly. *Flowers* mostly monœcious. *Male flowers* in deciduous catkins consisting of numerous sporophylls which are usually scale-like and bears 2-6 (rarely less or more) pollen sacs on the lower surface. *Female flowers* in cones consisting of scale-like open carpels which are flat or peltate and bear directly or on a subsidiary placental scale 1-many ovules. *Seeds* concealed between scales of a perfect cone; testa woody or leathery (no aril).

The wood is without vessels. Resin canals are present. It consists of long thick-walled tracheids arranged in radial lines with large bordered pits.

Cones perfect. Seeds concealed between scales, no aril :—

- (i) Leaves spirally arranged; carpels simple with 1 reversed ovule in the centre. Seeds adherent to scales

1. *Araucaria*.

- (ii) Leaves spirally arranged; ovules reversed; scales of cones numerous, spirally arranged:—

Pollen grains winged:—

Long shoots only present:—

Needles 4-angled. Cones pendulous; scale persistent. .. **2. Picea.**

Needles flat. Cones upright, scales deciduous. .. **3. Abies.**

Long and short shoots both present:—

Long shoots with scaly leaves, short shoots with green needles. **4. Pinus.**

Needles on both shoots. .. **5. Cedrus.**

Pollen grains not winged:—

Needles flat. Cones pendulous, scales persistent. .. **6. Tsuga.**

(iii) Leaves spirally arranged; ovules erect; scales rudimentary or weakly developed:—

Long shoots only present; carpels with toothed scale. .. **7. Cryptomeria.**

(iv) Leaves opposite or whorled, rarely alternate, often heterophyllous; ovules erect; scales of cones few:—

Cones woody when ripe; carpels peltate. Seeds with orbicular wing. **8. Cupressus.**

Cone baccate or drupaceous. Seeds not winged. .. **9. Juniperus.**

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Araucaria excelsa R. Br. (Norfolk Island Pine).

A handsome tree with graceful feathery branches; main branches horizontal, whorled; lateral branchlets horizontal or pendulous; outer bark peeling off in thin flakes. *Leaves* dimorphic, needle-like, incurved, bright green on young or lateral branchlets (.5 in. long), broadly ovate and overlapping, on older branchlets (.25 in. long). *Cones* 3-4 by 3.5-4.5 in.. *Seed* 1.1-2 by .2-.3 in.

A native of NORFOLK ISLAND. Sometimes cultivated.

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Picea Smithina Boiss. Syn. *Picea Morinda* Link. The Himalayan Spruce.

A tall stately tree, reaching a height of 200 ft. and a girth of 20 ft. *Bark* greyish, shallowly furrowed, and with

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Cultivated in Shillong.

Flrs. 4. Cones ripe 10-11.

3. ABIES Juss.

***Abies Webbiana* Lindl.** The East Himalayan Silver fir.

An enormous lofty tree (150-200'/20-30'); branches pendulous. *Bark* dark-brown or greyish-black, deeply fissured. *Leaves* .5-2 in. long, distichous, needle-like, flattened, all round the branchlets. *Flowers* monœcious. *Male catkins* clustered; stamens with 2 linear pollen sacs. *Cones* erect; scales thin, breaking away from a persistent woody axis when ripe, fan-shaped, suddenly contracted to a short claw; ovules recurved in the axils. *Ripe cones* cylindric, thicker and shorter than *A. Pindrow* (4-7 by 1.5-3); wing $1\frac{1}{2}$ times the length of the seed.

Flrs. 4. Cones ripen in 9-10.

BALIPARA FRONTIER TRACT (Common on Piri mountains 10,000 ft.) (Dr. N. L. Bor).

A. Delavayi

A tall tree (60-100 ft. high); young shoots reddish-brown. *Leaves* about 1 in. long (arranged as in *A. Webbiana* but shorter) dark glossy-green and furrowed above; midrib prominent beneath with 2 broad white bands of stomata; margins somewhat revolute. *Cones* 3-4 in. long, barrel-shaped, dark violet-black; in ripe cone the apex of the scale is slightly exerted.

BALIPARA FRONTIER TRACT, Piri Mountain—10,000 ft. (Dr. N. L. Bor).

4. PINUS Linn.

Evergreen trees; branches whorled; shoots dimorphic (long and short). *Leaves* needle-like or scaly. *Flowers*

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Needles in bundles of 3 :—

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Leaves 9-15 in. long; cones ovoid, 4-8 in. long. 2. *P. longifolia*.

Needles in bundles of 5 :—

Cones 6-12 in. long, cylindrical. .. 3. *P. excelsa*.

1. *Pinus Khasya* Royle. Vern. *Dieng-se, Dieng-kysi*, Khasi; *Saral*, Beng.

A tall gregarious tree (150'); branches whorled. *Bark* thick, deeply and reticulately cracked, coming off in thick small plates. *Needles* 6-10 in. long, slender, back convex; sheath persistent, grey, lacerated at apex. *Cones* ovoid, solitary or in twos or threes, 2-3 in. long, about 2 in. across (beak of scale depressed) pyramidal with a blunt knob at the end; wings four times the length of the seed.

MANIPUR, NAGA HILLS and K. & J. HILLS, (upto 6,000 ft.).

Principal building timber of Khasi and Jaintia Hills. The resin can be distilled into a high class turpentine. The highly resinous heartwood is an excellent torch wood.

Flrs. 2-3. Cones ripen in about 2 years, persist long on the trees.

2. *Pinus longifolia* Roxb.

A tall gregarious tree; branches whorled. *Bark* 1-2 in. thick, deeply fissured into large plates which fall off. *Leaves* 9-15 in. long, slender, obscurely triquetrous. *Cones* solitary or 3-5 together, ovoid. 4-8 in. by 3-5 in., on short stalks. *Scales* 1-2 by .7 in.; beak 4-6-gonous, reflexed, much thickened, usually with a somewhat recurved pointed tip. *Seeds*

·3·5 in. long; wing membranous, rather longer than the seed; cotyledons 12.

BALIPARA FRONTIER TRACT (2,000 ft.).

I came across a solitary tree in Saralbhangra block (Goalpara). The timber is extensively used for railway sleepers (creosoted). Turpentine and rosin are manufactured from the resin.

Flrs. 2-4. Fr. Ripen in October of next year (?). The cones remain long on the trees.

3. *Pinus excelsa* Wall.

A large tree. *Bark* smooth, slate-coloured, corky, with shallow fissures. *Needles* 6-8 in. long, slender, bluish-green, triquetrous; sheaths entire, deciduous. *Cones* generally 2-3 together, 6-12 in. long, cylindrical; scales 2-2·5 by 1-1·5 in., spatulate, tips not much thickened. *Seeds* blackish, acute, compressed, ·25-·35 in. long; wing about three times the length of the seed, obliquely truncate; cotyledons usually 9.

BALIPARA FRONTIER TRACT, (Tenga Valley and Apatenong Valley 4,000 ft. and above (Dr. N. L. Bor).

Economic uses similar to *P. longifolia*.

Flrs. 4-6. Fr. Ripen in 9-11 of the second year.

5. CEDRUS Link.

Cedrus Deodara Loud. The Himalayan Cedar. *Devadaru*, Sans.

A large evergreen tree; branches not whorled; branches and branchlets horizontal; tips slender, nodding. *Bark* greyish-black or dark-brown, with vertical and diagonal fissures. *Leaves* 1-1·5 in. long, acicular, triquetrous. *Flowers* usually monœcious; male catkins solitary at the ends of branchlets; stamens with 2 pollen sacs. *Cones* erect, 4-5 by 3-4 in., ovoid or pyramidal, obtuse; scales imbricate. *Seeds* ·3-·6 in. long, triangular; wing ·6-·7 in. long; cotyledons usually about 10.

Cultivated in Shillong.

Best conifer-timber of Upper India, extremely durable. It is extensively used for building and railway sleepers. *Deodar oil* is extracted from the wood by destructive distillation and is used as a remedy for ulcers and eruptions.

There is a section in the Forest Research Institute, Dehra Dun; 27 ft. in girth, age of which is calculated to be 900 years.

Flrs. 9-10. Cones ripen in 10-11 of the following year.

6. TSUGA Carr.

Tsuga Brunoiana Carr.

A tall tree, attaining 120 ft.; branches spreading; branchlets pendulous. *Leaves* distichous, .5-1 in. long, white-mealy beneath. *Cones* ovoid, .5-.75 in. long; scales broadly elliptic, obtuse; supporting scales not projecting in the mature cone; wing $\frac{2}{3}$ rd the length of the scale.

BALIPARA FRONTIER TRACT. Fairly common on Piri Mountains 10,700 ft. (Dr. N. L. Bor). Also cultivated.

Flrs. 5-6. Fr. Cold weather of same year (Indian trees P. 693).

7. CRYPTOMERIA D. Don.

Cryptomeria japonica Don.

A stately fast-growing evergreen tree (about 120' in height); crown narrow, conical; heart-wood dark, reddish brown, fragrant. *Leaves* falcate, subulate, ascending, pointed on all directions, free portion about .5 in. long, the lower edge decurrent. *Flowers* monœcious. *Male catkins* clustered at the ends of branchlets; pollen sacs 3-5 at the base of scales. *Cones* globose, at the ends of branchlets; ovules erect, 2, at the base of scales. *Ripe cones* .6-.2 in. long, broadly ovoid; scales woody, pectinate and persistent after the fall of the seeds. *Seeds* compressed, angular.

Indigenous to JAPAN & CHINA.

Cultivated in K. & J. HILLS, (4-5,000 ft.), NAGA HILLS & MANIPUR.

8. CUPRESSUS Linn.

Evergreen shrubs or trees; branches whorled. *Leaves* small, scale-like, closely adpressed, opposite, mostly imbricate. *Flowers* monœcious at the ends of short branchlets. *Male catkins* numerous, cylindric, solitary at the tips of the branchlets; stamens peltate, stipitate, bearing on the lower edge 2-6 globose pollen sacs. *Female flowers* in cone of

3-12; scales decussate, peltate; the middle ones bearing above their base 2 to many erect ovules. *Cone* globose, woody. *Seeds* small, compressed or angular, winged; cotyledons 2-4.

Branchlets drooping, forming a broad pyramidal crown :—

Branchlets are not rough to the touch. .. 1. *C. torulosa*.

Branchlets pendulous spreading in the same plane :—

Branchlets are rough to the touch. .. 2. *C. funebris*.

1. *Cupressus torulosa* D. Don.

A large evergreen tree; branchlets drooping. *Bark* greyish-brown, peeling off in long thin strips. *Leaves* .05 in. long, small, scale-like, closely adpressed, opposite in pairs, imbricate, triangular. *Flowers* monœcious. *Male catkins* numerous, solitary at the tips of the branchlets, ovoid, small; stamens peltate, stipitate, bearing on the lower edge 2-6 globose pollen sacs. *Female flowers* in cones consisting of 6-10 decussate peltate scales; the middle scales bearing 4-6 erect ovules at the base. *Ripe cones* globose, clustered, .5-.7 in. across; scales woody. *Seeds* compressed, .2 in. across including the orbicular wing; cotyledons 2-3.

BALIPARA FRONTIER TRACT, Tenga Valley 6-8,000 ft. (Dr. N. L. Bor). Cultivated in Shillong.

Flrs. 2-3. Fr. 10-11. "The cones take 2 years to mature." *Parker*.

2. *Cupressus funebris* Endl. The Chinese weeping Cypress.

A medium-sized handsome tree; branches pendulous. *Leaves* closely pressed, free and pointed at the apex. *Male catkins* .1 in. long. *Ripe cone* .3-.7 in. in across. *Seed* small, winged.

Cultivated in Shillong.

9. JUNIPERUS Linn.

Shrubs or trees, aromatic, heart-wood distinct, generally red. *Leaves* often glandular at back, all linear or subulate, in whorls of 3 or scale-like, opposite in pairs on young shoots vigorous subulate and spreading. *Flowers* monœcious

or diœcious. *Male catkins* small, cylindric or ovoid; stamens decussate or in threes; connective enlarged, ovate or peltate at the apex, bearing, 2-6 globose pollen sacs at the base. *Female flowers* in cones consisting of 2-6 opposite or terminal scales (lower sterile); ovules 1-2 to each fertile scale, upright. *Cone* berry-like, more or less succulent. *Seeds* one or more, hard, bony, not winged; cotyledons 2-6.

Leaves pungent, all linear. Cone 1 seeded,
 ovoid. 1. *J. recurva*.
 Leaves dimorphous, mostly scale-like. Cone
 2-5 seeded, globose. 2. *J. macropoda*.

1. *Juniperus recurva* Buch-Ham.

A gregarious shrub. *Bark* reddish, exfoliating in thin strips. *Leaves* .1-.2 in. long, more or less adpressed, in whorls of 3, lanceolate, sharply pointed, ascending, loosely imbricated; back convex. *Male catkins* berry like. *Cones* at ends of short lateral leafy branchlets. *Fruit* ovoid, .3-.5 in. long, pointed, shining, dark-brown or blackish purple when ripe. *Seed* 1, oblong.

MISHMI HILLS, 9,000 ft. (Sheet No. 7669).

Flrs. 6-7. Ripe fruit 7-10 (following year).

2. *Juniperus macropoda* Boiss.

A small or middle-sized tree. *Bark* reddish-brown, fibrous, vertically fissured, exfoliating in strips. *Leaves* dimorphous, subulate and pungent on young shoots, scale-like on mature branches, closely adpressed with a large resinous glands on the back. *Flowers* monœcious. *Male catkins* at the ends of branchlets. *Fruit* almost globose, .3 in. across, blue-black when ripe, very resinous; the tips of the scales forming transverse ridges. *Seeds* 2-4.

MANIPUR (Political Agent 1914, probably introduced).

Flrs. 5. Fr. 10.

FAM. 135. CYCADACEÆ.

Shrubs or trees, trunk cylindric, sometimes forked, in appearance and habit like tree ferns. *Leaves* in a terminal crown or arising from a stemless simple or branched rhizomes. *Leaves* are usually of 2 sorts, foliage and scale leaves, borne spirally upon the stem and alternate with one over another and as a rule several such of scaly leaves before each circle of foliage. *Foliage* leaves palm-like, pinnati-partite with thickened woody more or less sheathing base which often persists after the fall of the remaining part of the leaf; segments of leaves entire or toothed, usually very rigid and leathery. *Flowers* diœcious and usually take the form of cones. *Male flowers* in one or more terminal cones, composed of numerous fleshy flat or variously peltate scales crowded beneath with numerous anther-cells upon the lower side arranged with lines of dehiscence radiating from the centre. *Female carpophylls* in cones or in crowded whorls round the apex of the stem (*Cycas*) each bearing as a rule only 2 ovules; ovules large, orthotropous, with one integument. *Seeds* large, drupe-like; endosperm copious; radicle superior, attached to a long suspensory cord; cotyledons 2.

CYCAS Linn.

Shrubs or trees with a simple or rarely branched, cylindric caudex clothed with the woody bases of the sheathing leaves which are rigid and leathery. *Leaves* pinnati-partite; segments linear, involute in vernation; the rachis (petiole) short, frequently thorny at the base (metamorphosed segments of leaves). *Male cones* closely imbricated and usually prolonged in long acumen; female no proper cone. *Carpophylls* densely woolly, numerous, in crowded whorls round the apex of the stem, adpressed in an apparently terminal cone then spreading, elongate, flattened, dilated above into an entire crenate or pectinate blade. *Ovules* 1-5 in notches on either side of the carpophyll-stalk, distant. *Seeds* ellipsoid or globose.

Margins of leaf segments flat :—

Carpophyll blade almost orbicular, pectinate. 1. *C. pectinata*.

Margins of leaf segments revolute :—

Carpophyll blade ovate-lanceolate. .. 2. *C. revoluta*.

1. *Cycas pectinata* Griff. Vern. *Dieng-sia-goda*, Khasi; *Thaljimura*, Ass.

An evergreen small palm-like tree (upto 22'), glabrous, sometimes forked. *Leaves* 4-7 ft. long; segments 6-10 by .2-.4 in.; rachis (petiole) about 18 in. long, with a few distant thorns near the base; base more or less sheathing. *Male cone* about 18 in. by 6 in.; antheriferous scales about 1.5 by 1 in. *Carpophylls* 6 in. long, densely twany silky; blade almost orbicular, 3 in. across, cut into subulate pectinate spiny teeth (.5-.8 in. long), terminating in a strong subulate acumen (1 in. long); stalk about as long as the blade. *Ovules* 2-3 pairs, glabrous. *Seeds* ovoid, glabrous, 1.5-2 in long, orange or yellowish orange.

GOALPARA, KAMRUP, MANIPUR and K. & J. HILLS, (2,000 ft.).

Young shoots used as vegetable (Goalpara). The fleshy stem is pounded and used as a hair wash for diseased root hairs (Kamrup).

Flrs. 5.

2. *Cycas revoluta* Thunb.

A more dwarfy species. *Leaves* 2-6 ft. long; segments revolute. *Carpophylls* 4-9 in. long, ovate, laciniate; stalk longer than blade.

Native of JAPAN commonly cultivated in gardens of Shillong.

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OF

VERNACULAR, SANSKRIT AND ENGLISH NAMES

(*Ass.* means Assamese; *Beng.* Bengali; *Cach.* Cachar or Cachari; *Duff.* Duffla; *Kach.* Kachari; *Kh.* Khasi; *Lush.* Lushai; *Manip.* Manipuri; *Mik.* Mikir; *Nep.* Nepali; *Sans.* Sanskrit; *Slyh.* or *Syl.* Sylhet; *Synt.* Synteng; *Tipp.* Tippera; *Eng.* English).

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FLORA OF ASSAM

VOL. V.

GRAMINEÆ

BY

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FOREWORD

This account of the Gramineæ of Assam is based upon the collections housed in the herbaria at Kew, Calcutta, Dehra Dun and Shillong which have been examined through the courtesy of the Directors. Capt. Kingdon-Ward, the explorer botanist, when touring in the Balipara Frontier Tract was good enough to put together a collection of grasses which he sent to the author at Dehra Dun. This gathering added many new records to the known grass flora. It can with confidence be stated that the systematic collection of these interesting plants in the higher regions of the Eastern Himalaya will add appreciably to the number of species which have been described in this book.

In the descriptions of genera and species I have had no hesitation in borrowing from others where an excellent description of a species or genus was in existence. In this respect I am much indebted to the giants of old, Eduard Hackel and Otto Stapf and, of the modern agrostologists, to A. Camus and C. E. Hubbard. The latter has always been ready to answer my repeated and often tedious questions. His exhaustive treatment of the *Gramineae* in Hutchinson's Families of Flowering Plants, Vol. II, has been a real source of inspiration and guidance and I have borrowed largely from it. Mr. V. Narayanaswami of the Botanical Survey of India, has placed his knowledge of the literature relating to grasses at my disposal and I have made full use of it. The Curator of the Herbarium, Royal Botanic Garden, Sibpur, has been most kind in sending me sheets of material which I wished to examine.

N. L. Bor.

FLORA OF ASSAM

GRAMINEÆ.

Annual or perennial herbs, rarely shrubs or trees; stems erect, ascending or prostrate and creeping, usually branched at the base, in perennials forming sterile shoots (innovations) and flowering stems (culms), in annuals only the latter present; culms cylindrical, rarely flattened, jointed, usually hollow in the internodes, closed at the nodes. *Leaves* solitary at the nodes, sometimes crowded at the base of the stems, alternate and two-rowed, consisting of sheath, ligule, and blade; sheaths encircling the culm, with the margins free and over-lapping or more or less connate, frequently swollen at the base (sheath-node); ligule placed at the junction of the sheath and blade, membranaceous or reduced to a fringe of hairs, rarely absent; blades usually long and narrow, rarely broad, usually passing gradually into the sheath, rarely with a petiole-like base, flat, convolute or involute or terete, parallel-nerved. *Flowers* usually hermaphrodite, sometimes unisexual, small and inconspicuous, usually consisting of stamens and pistil and of 2 or 3 minute hyaline or fleshy scales (lodicules) representing the perianth, sub-sessile between two bracts (lemma and palea), the whole forming a floret or false flower. *Florets* one to many, distichous, sessile on a short or minute slender axis (rhachilla) and bearing at the base two empty bracts (upper and lower glume), the florets and glumes forming a spikelet. *Spikelets* pedicelled in open or contracted panicles or racemes, or sessile in spikes. *Stamens* hypogynous, 1 to 6, rarely more, usually 3, with delicate filaments and 2-celled anthers, the latter opening usually by a longitudinal slit; ovary 1-celled, with one anatropous ovule often adnate to the adaxial side of the carpel; styles usually 2, rarely 1 to

3; stigmas generally plumose; fruit mostly a caryopsis with a thin pericarp adnate to the seed, or rarely a nut or a berry or a utricle with a free pericarp, with starchy endosperm and a small embryo at the base on the abaxial face.

Key to the sub-families of the *Gramineæ*.

Spikelets 1- to many-flowered, breaking up at maturity above the more or less persistent glumes, or if falling entire then not 2-flowered with the lower floret male or barren and the upper hermaphrodite, usually more or less laterally compressed or terete. **Pooideæ.**

Spikelets 2-flowered, falling entire at maturity, usually with the upper floret fertile and the lower male or barren and in the latter case often reduced to the lemma, all alike or different in size, shape and structure, frequently dorsally compressed. **Panicoideæ.**

Key to the tribes of the *Pooideæ* (after Hubbard).

- A. Shrubs or trees with woody often tall persistent culms; leaf-blades flat, many-nerved, often with transverse veins, usually with a petiole-like base which is articulated with the sheath; spikelets bi-sexual; lemmas 5- to many-nerved, usually awnless; lodicules usually 3; stigmas mostly 2 or 3. **1. Bambuseæ.**
- AA. Perennial or annual herbs; leaf-blades usually sessile and not articulated with the sheaths.
 - B. Spikelets borne in open or contracted or spike-like panicles, less often in racemes or spikes, and then with the lower or both glumes suppressed if on opposite sides of a continuous rhachis, or with 2 or more fertile florets if on one side of the rhachis.
 - C. Spikelets usually with 2 or more fertile florets, or if with 1 fertile floret then with sterile florets above it.
 - D. Lemma and rhachilla glabrous or hairy, in the latter case with the hairs not enveloping the lemma or if so then with the lemma bearing a geniculate awn; low or moderately tall grasses.
 - E. Glumes usually shorter than the lowest floret and with the upper florets distinctly exserted, rarely longer and then usually with firm dull margins like the lemmas; lemmas awnless or with a straight or curved awn from the entire or bifid apex, or several-awned or lobed.
 - F. Lemmas usually 5- to many-nerved.
 - G. Leaf-blades broad, many-nerved with transverse veinlets. **2. Centothecæ.**
- GG. Leaf-blades flat, convolute or involute without transverse veins. **3. Festucæ.**
- FF. Lemmas 1- to 3-nerved. **6. Eragrostæ.**

- EE. Glumes usually as long as or longer than the lowest floret, often as long as the spikelet and enclosing the florets; lemma awnless or more often awned from the back or the sinus of the 2-lobed tip; the awn usually geniculate; glumes or lemmas or both frequently with thin shining margins. **9. Aveneæ.**
- DD. Lemmas or rhachilla joints bearing long silky hairs which envelop the lemma (at least in fertile florets); lemmas awnless or with a straight awn from the tip, often thin; tall grasses with usually large plume-like panicles. **5. Arundineæ.**
- CC. Spikelets with 1 fertile floret (male or female in unisexual 1-flowered spikelets) with or without 1 or 2 male or barren florets below it.
- H. Glumes very minute or suppressed; palea 3- to 9-nerved; stamens usually 6; leaf blades not transversely veined. **14. Oryzæ.**
- HH. Glumes usually well developed, at least the upper, rarely minute or suppressed.
- I. Spikelets with 3 florets, the lower 2 florets male or barren and the terminal hermaphrodite. **13. Phalaridæ.**
- II. Spikelets with 1 or 2 florets.
- J. Spikelets with 2 florets, the lower male or barren the upper hermaphrodite.
- K. Lower floret barren and without a palea; glumes up to half the length of the spikelet; rhachilla produced beyond the upper floret; spikelets disarticulating with part of the pedicel attached. **15. Thysanolanææ.**
- KK. Lower floret male or barren usually with a palea; upper glume as long as the spikelet; rhachilla disarticulating below the upper floret and not produced beyond it; glumes more or less persistent. **16. Arundinellæ.**
- JJ. Spikelets with 1 floret.
- L. Spikelets usually breaking up at maturity, the rhachilla disarticulating above the more or less persistent glumes, very rarely falling entire and then with firmly membranous, awned or 5-nerved lemmas.
- M. Lemmas hyaline or membranous at maturity, rarely indurated and then laterally compressed, awnless or awned from low down on the back or from the entire or bifid tip.
- N. Lemmas usually 3- to 5-nerved, frequently awned; glumes firmer and longer than the hyaline lemma or if shorter than the lemma, herbaceous-membranous and dull; grain usually with an adhering pericarp. **10. Agrostæ.**
- NN. Lemmas 1- to 3-nerved, awnless; glumes and lemma very similar in texture, hyaline or thinly membranous, shining; grain usually with a free pericarp. **7. Sporobolæ.**
- MM. Lemmas indurated and rigid at maturity, terete or dorsally com-

pressed, with involute or convolute margins, tightly enveloping the grain, with a terminal awn or sometimes awnless.

11. Stipeæ.

- LL. Spikelets falling entire at maturity, either singly or in clusters from the axis of slender spike-like panicles or racemes; lemma delicate, 1- to 3-nerved.

12. Zoysieæ.

- BB. Spikelets sessile or shortly pedicelled along one side of the rhachis of solitary, digitate or scattered spikes or spike-like racemes (with 1 fertile floret and 1- to 3-nerved lemmas), or on the opposite sides of the rhachis of solitary spikes or racemes.

- O. Spikelets on opposite sides of the rhachis of solitary spikes.

4. Hordeæ.

- OO. Spikelets in one or two rows on one side of the usually continuous rhachis of digitate spikes.

8. Chlorideæ.

Key to the tribes of the *Panicoideæ*.

- A. Spikelets all hermaphrodite, with male or barren or hermaphrodite spikelets mixed in the same inflorescence and so arranged that a male or barren spikelet is near a hermaphrodite spikelet, if unisexual then the lemma of the fertile floret indurated.

- B. Spikelets solitary or paired, more or less similar; glumes usually membranous, the lower usually smaller or sometimes suppressed; lower lemma mostly resembling the upper glume in texture; upper lemma papery to very tough and rigid, usually awnless.

17. Paniceæ.

- BB. Spikelets often paired, with one sessile and the other pedicelled, those of each pair similar or more often dissimilar, rarely solitary and all alike; glumes as long as the spikelet and enclosing the florets, more or less rigid and firmer than the lemmas which are both hyaline or membranous; upper lemma usually awned.

18. Andropogoneæ.

- AA. Male and female spikelets in separate inflorescences or in different parts of the same inflorescence and of different appearance; lemmas hyaline or membranous and thinner than the glumes.

19. Maydeæ.

1. BAMBUSEÆ.

Shrubs or trees, very rarely perennial herbs; culms erect or sometimes climbing, often tall, usually woody, rarely herbaceous, bearing sheaths with reduced blades; leaf-blades flat, usually linear or oblong-lanceolate, many-nerved, mostly with a petiole-like base and frequently articulated with the sheath; spikelets all alike, 1 to many-flowered, arranged in panicles, racemes, dense clusters, or

terminal heads; glumes usually 2 or sometimes more; lemmas resembling the glumes and exserted from them, awnless or rarely awned from the tip, 5- to many-nerved, herbaceous to coriaceous; paleas 2-keeled or keelless or suppressed; lodicules usually 3, rarely more or less; stamens 3, 6, or more, with the filaments free or more or less connate; styles mostly 2 or 3; fruit a nut, berry, or a caryopsis.

Key to the genera of *Bambuseæ*.

- A. Stamens 3, rarely 6.
- B. Styles short.
- C. Leaves more or less tessellate. Shrubby bamboos. Ultimate branches of the inflorescence without bracts at the base.
- D. Style 1, trifid.
- E. Culm-sheaths persistent. **11. Arundinaria.**
- EE. Culm-sheaths deciduous. **12. Semiarundinaria.**
- DD. Styles 2, free or connate at the base.
- F. Glumes tessellate, smooth. **14. Sinobambusa.**
- FF. Glumes not tessellate, with raised longitudinal nerves. **13. Chimonobambusa.**
- CC. Leaves not tessellate. Ultimate branches of the inflorescence with bracts at the base. **15. Thamnocalamus.**
- BB. Styles long. **16. Phyllostachys.**
- AA. Stamens six, rarely more.
- G. Pericarp thin, adnate to the grain, adhering to the hilum only.
- H. Stamens 6 with free filaments. **8. Bambusa.**
- I. Paleas of the upper florets indistinctly or not keeled: spikelets 1-3-flowered. **10. Oxytenanthera.**
- II. Paleas of all the florets strongly keeled. **9. Gigantochloa.**
- GG. Pericarp crustaceous or fleshy, separable from the grain.
- J. Paleas 2-keeled.
- K. Spikelets with 2-5 central florets hermaphrodite.
- L. Spikelets with 2-3 central florets female or hermaphrodite; pericarp of fruit crustaceous. **1. Dendrocalamus.**
- LL. Spikelets with 3-5 central hermaphrodite florets; lodicules 3.
- M. Fruit globose. **2. Pseudostachyum.**
- MM. Fruit elongated. **3. Teinostachyum.**
- KK. Spikelets with 1 central floret hermaphrodite; lodicules 3. **4. Cephalostachyum.**
- JJ. Palea similar to the lemma.
- N. Filaments connate into a tube. **5. Neohouzeaua.**
- NN. Filaments free.
- O. Fruit large pyriform. **7. Melocanna.**
- OO. Fruit small. **6. Dinochloa.**

1. DENDROCALAMUS Nees.

Spikelets ovate or oblong; acute or obtuse, few- to many- flowered, with concealed rhachilla, which is scarcely articulate and often produced; lower florets imperfect, 1-2, reduced to the lemma; 2-3 florets hermaphrodite with lemma and palea; terminal floret rudimentary or absent; glumes 2-3, often gemmiparous, membranous or rigid, muticous or mucronate, the upper often with a ciliate keel; lemmas papyraceous or membranous, subulate or mucronate at the apex, sometimes spinescent, back glabrous, hirsute or silky, margins glabrous or ciliate, many-nerved; paleas narrow, obtuse, those of the lowest florets 2-keeled, ciliate on the keels, those of the terminal floret rounded on the back. *Lodicules* absent. *Stamens* 6: filaments free; anthers mucronate or with tufted hairs; ovary sub-globular or ovoid, hairy above; style filiform, hairy: stigmas 1-2-3, subulate, papillose. *Caryopsis* with a crustaceous pericarp.

Arborescent bamboos often of large size. Inflorescence a large compound panicle, the spikelets usually congested in groups along the nodes of the floriferous branches.

Key to the species of *Dendrocalamus*.

- Spikelets in spinous, congested, spicate heads;
leaves usually narrow. 1. *D. strictus*.
- Spikelets in large, soft, congested heads.
Spikelets acute, culm-sheaths very hairy.
Heads large, dark coloured; leaf and
culm-sheaths conspicuously fringed. . . . 2. *D. sikkimensis*.
Heads small, pale; leaf sheaths naked;
culm-sheaths little fringed. 3. *D. hookeri*.
- Spikelets blunt, culm-sheaths glabrous or
nearly so.
Culm- and leaf-sheaths not fringed. . . . 4. *D. hamiltonii*.
Culm- and leaf-sheaths long fringed. . . . 5. *D. patellaris*.
- Spikelets few, in small heads, many sterile.
Spikelets long, ovate-acute. 6. *D. giganteus*.
Spikelets short, blunt; culm-sheaths long,
thin. 7. *D. longispathus*.

1. *Dendrocalamus strictus* Nees, in Linnaea IX (1834) 476.

A deciduous, densely-tufted bamboo. *Culms* hollow in wet, solid in dry climates, 6-20 m. tall, 2.5-7.5 cm. in dia-

meter, glaucous-green when young, dull-green or yellowish when old; nodes somewhat swollen; internodes 30-45 cm. long. *Culm-sheaths* variable, 7·5-30 cm. long, covered on the back with golden-brown, stiff hairs, sometimes glabrous, striate, rounded at the top, very slightly auricled, ciliate on the margins; imperfect blade triangular, subulate, hairy on both sides; ligule narrow. *Leaves* linear-lanceolate, 2·5-25 cm. long, 5 mm.-3 cm. broad, rounded at the base into a short petiole, terminating above in a sharply acuminate, twisted point, rough and often hairy above, softly hairy below, scabrous on the margins; leaf-sheaths striate, hairy, ending in a prominent callus and short auricle with a few, wavy, deciduous cilia; ligule narrow.

Inflorescence a large branching panicle of large, dense, glabrous, spaced heads; rhachis rounded, smooth. *Spikelets* spinescent, usually hairy, the fertile mixed with many smaller, sterile ones, 7·5-12·5 mm. long, with 2-3 fertile florets. *Glumes* 2 or more, ovate, spinescent, many-nerved; lemmas ovate, ending in a sharp spine surrounded by ciliate tufts of hair; palea ovate or obovate, emarginate, lower 2-keeled, ciliate on the keels, uppermost not keeled, often nearly glabrous, 6-8-nerved. *Stamens* long exserted; anthers yellow, shortly apiculate. *Ovary* turbinate, stalked, hairy above; style long, ending in a purple feathery stigma. *Caryopsis* brown shining, ovoid to sub-globose, 7·5 mm. long, beaked.

Cultivated in the plains.

2. *Dendrocalamus sikkimensis* Gamble, in Hooker Ic. Pl. t. 1770.

A large bamboo with caespitose stems and few culms. *Culms* 17-22 m., bare at the base, branchy at the top, 12-18 cm. in diameter, dark green in colour; internodes up to 45 cm. long, rough. *Culm-sheaths* 36 cm. long by 30 cm. broad, densely covered with golden-brown hairs; imperfect blade lanceolate, often as long as the sheath, recurved, decurrent into two auricles fringed with long, curved, pale bristles; ligule 5 mm. wide, sharply serrate. *Leaves* variable in size; those of the ordinary branches 15-25 cm. long by 36-50 mm. wide, oblong-lanceolate, unequal at the base, tapering to a

twisted point, shortly petiolate, thick, smooth above strigosely hirsute and rough below, margins rough; those of young shoots up to 30 cm. long by 7.5 cm. broad, elliptic-acuminate; leaf sheaths smooth, glabrous, furnished at the edges with falcate, hairy auricles fringed with stiff bristles; ligule short, hairy, fimbriate.

Inflorescence a large panicle with stiff nodose branches, bearing large, red-brown, globose heads usually 5 cm. apart and 3.75 cm. in diameter; rhachis dull brown, sparsely pubescent. *Spikelets* lanceolate, often rounded, 13-19 mm. long. *Glumes* 3-4, empty, broadly ovate rounded with ciliate keels. *Hermaphrodite* florets 2-3; lemmas ovate-acute, glabrous mucronate, ciliate; palea of the lowest floret 2-keeled, densely hairy on the keels, many-nerved, shortly bifid; upper floret sterile and reduced to a chaffy scale. *Stamens* six. *Ovary* sub-globular, hairy, with a short, thick, hairy style and club-shaped hairy stigma. *Caryopsis* obovate, depressed, apiculate, shining above with a few hairs.

Very common in the NAGA HILLS and also in the GARO HILLS.

3. *Dendrocalamus hookeri* Munro, in Trans. Linn. Soc. XXVI (1868) 151.

A large bamboo with caespitose stems and long curving branches. *Culms* 15-20 m. tall, often naked at the base, 10-15 cm. in diameter; internodes 40-50 cm. long, the lower sometimes rough, hairy. *Culm-sheaths* very broad at the base, narrower on the young shoots and on the upper branches, covered on the outside with dense, black or brown hairs, glabrous inside, furnished with small, rounded auricles covered with long stiff cilia, ciliate on the edges; imperfect blade rounded at the base, triangular or long-cuspidate, 7.5-17 cm. long, hairy at the top; ligule glabrous. *Leaves* large, oblong-lanceolate, acuminate, ending in a twisted point, rounded at the base, shortly petioled, smooth above, rough below, hairy towards the base, with scabrid margins; median nerve brilliant yellow; sheaths striate, hairy at the base; ligule glabrous.

Inflorescence a large, compound panicle bearing at intervals of 5-7.5 cm. dense glabrous heads of spikelets, 2.5 cm.

FLORA OF ASSAM, VOL. V.

CORRIGENDA

<i>Page</i>	<i>Line</i>			
95	16	<i>for</i> 1892	<i>read</i> 1897	
97	10	„ 226	„ 266	
115	29	„ scabrous	„ scaberulous	
166	17	„ hispiduous	„ hispidulous	
„	26	„ 3 mm.	„ 3.5 mm.	
„	27	„ 5 mm.	„ 6.5 mm.	
179	21	„ .2	„ 2	
203	in key	„ <i>pedicellata</i>	„ <i>pedicellaris</i>	
„	13	„ 2-2.5 mm.	„ up to 3 mm.	
204	21	„ 2-3	„ 3-3.5	
238	28	<i>delete</i> 2.25-2.5 mm. and the brackets		
258	in key	<i>transpose</i> contrasting characters		
286	1	<i>for</i> mm.	<i>read</i> cm.	
290	33	„ 3.75	„ 3	
291	7	„ roundate	„ rotundate	
307	33	„ <i>Mnesithea</i>	„ <i>Hemarthria</i>	
„	38	„ <i>Hemarthria</i>	„ <i>Mnesithea</i>	
311	13	<i>delete</i> length of racemes and <i>add</i> "spkts. 2-2.5 mm."		
„	16	„ „	„ and <i>add</i> "spkts. 5-5.5 mm."	
323	8	<i>for</i> 3.5	<i>read</i> 4-5	
„	10	„ 5.6	„ 5-6	
343	4	„ <i>cummingii</i>	„ <i>cumingii</i>	
344	14	„ <i>contorum</i>	„ <i>contortum</i>	
376	in note	Nayaranaswami is author's name		
377	Distribution:—	Khasi and Naga Hills, 3-5,000 ft.		
378	„	:—Common, plains and hills up to 4,000 ft.		
380	19	<i>for</i> nerves	<i>read</i> never	
386	8	„ perennial	„ annual	
400	29	„ <i>Sachizachyrium</i>	<i>read</i> <i>Schizachyrium</i>	
405	18	<i>delete</i> "nerved"		
408	11	<i>for</i> Haines, etc., <i>read</i> A. Camus in Bull. Mus. Hist. Nat. Paris, XXVI (1920) 425		
409	3	„ 20	<i>read</i> 200	

in diameter; rhachis dull grey-green, striate, somewhat hirsute. *Spikelets* 8-10 mm. long, by 2.5 mm. broad, ovate, acute, slightly pubescent, with 2-3 fertile flowers. *Glumes* 2, ovate-obtuse; lower lemma ovate-acute; upper many-nerved, nerves anastomising; palea acute, 2-keeled, hairy on the keels; upper palea hardly keeled, ciliate at the top. *Stamens* 6, hardly exserted; anthers long, ending in a penicillate point. *Ovary* narrowly ovoid, acuminate, hairy, surmounted by a hairy style ending in a twisted plumose stigma. *Caryopsis* hairy at the base.

NAGA HILLS and KHASI HILLS; very common.

4. *Dendrocalamus hamiltonii* Nees et Arn. ex Munro, in Trans. Linn Soc. XXVI (1868) 151. Local names :—*Kakua*, Assam; *Pecha*, Bengali.

A large bamboo with caespitose culms, sometimes growing tall and erect, but more often sending out its stems at an angle or curved downwards. *Culms* large, 12-20 m. or up to 25 m. tall, usually naked below, much branched above; 10-18.5 cm. in diameter, greyish-white when young with dense appressed pubescence, dull green when old; nodes marked with root scars; internodes 30-50 cm. long, wall 1.25 cm. thick. *Culm-sheaths* long and stiff, variable in size, those of the lower part of large culms 35-45 cm. long, about 20 cm. broad, glabrous, shining within, rough, glabrous or with scanty patches of stiff brown hairs without, truncate at the top; imperfect blade about $\frac{3}{4}$ the top of the sheath, broad, often 30 cm. long, narrow, ovate-lanceolate, sides incurved, glabrous without, closely covered with thick, black, sharp hairs within at the base; ligule smooth, entire. *Leaves* variable, small on side branches, but on new shoots reaching 37.5 cm. long 3.75 cm. broad, rounded at the base into a short thick petiole, broadly lanceolate, ending in an acuminate, scabrous, twisted point, smooth above, rough beneath, finely serrate on the margins; leaf-sheaths covered with white, appressed, stiff hairs, glabrous above, shining on the callus, somewhat keeled; ligule long, oblique truncate and jagged.

Inflorescence a huge, much-branched panicle with many whorls of branches, bearing half-verticillate semi-globular

heads of purple flowers, supported by round scarious bracts; rhachis joints 2·5 cm. or less long, thick, fistular, scabrous and white pruinose; heads variable, 1·75-3·25 cm. in diameter. *Spikelets* purple, ovoid, depressed, 10 mm. long, glabrous. *Glumes* usually two, short, rounded, nerved; lemmas broad, orbicular, somewhat recurved, ciliate on the edges; paleas of lower flowers, 2-keeled, ciliate on the keels and bifid at the acute apex, many-nerved. *Stamens* exerted, pendulous; anthers purple, the connective produced into a long, black, hairy, twisted point. *Ovary* sub-orbicular, hairy; style long hairy; stigmas 3, plumose. *Caryopsis* broadly ovoid, beaked, glabrous or hairy above.

The commonest bamboo in the ASSAM VALLEY where it is in great demand for constructing temporary huts, basket and mat work etc. Also occurs in the KHASI HILLS and the SURMA VALLEY.

5. *Dendrocalamus patellaris* Gamble, Bamb. Brit. Ind. (1896) 86.

A rather soft, evergreen, caespitose bamboo. *Culms* 7-10 m. tall, 2·5-3·75 cm. in diameter, dull green, striate; nodes marked by a projecting, softly hairy ring; internodes 30-45 cm. long, whitish below the nodes; walls thin. *Culm-sheaths* long persistent, 25-30 cm. long, 7·5 cm. broad at the base, sparsely covered with appressed, brown, stiff hairs outside, glabrous within, attenuate at the top; margins membranous, lacinate; imperfect blade lanceolate, 15 cm. long, usually recurved; ligule long, fimbriate. *Leaves* variable, 20-40 cm. long by 2·5-10 cm. broad, unequal at the base, shortly petioled, terminating above in a twisted scabrous point, smooth above, rough below, scaberulous on the margins; leaf-sheaths striate, keeled, fringed on the margins; ligule very long, long fimbriate.

Inflorescence a huge compound panicle with spicate branches bearing distant distichous heads, heads 1·25-2·5 cm. in diameter, supported by hard shining bracts, many-spiculate; rhachis dull greenish brown, rough, fistular. *Spikelets* dark brown, depressed, 10 mm. long. *Empty glumes* 1 or 2, many-nerved, membranous; florets 2-3, usually all fertile; lemmas orbicular, cuspidate, ciliate on the edges

and densely tomentose within, 9-11-nerved; palea much shorter, ovate-lanceolate, ciliate on the keels, 2-nerved between the keels, densely tomentose within; rhachilla prolonged, bistle-like. Lodicules 0 or 2, narrow linear-lanceolate, long ciliate. *Stamens* exserted; anthers purple, tip conical, hairy, apiculate. *Ovary* broadly ovate, hairy above; stigmas 3, short, plumose. *Caryopsis* rounded, shining, hairy above.

Common in the AKA HILLS at 5,000 ft. also in the NAGA HILLS about Kohima and Wokha.

6. *Dendrocalamus giganteus* Munro, in Trans. Linn. Soc. XXVI (1868) 150.

The largest of the bamboos, densely caespitose. *Culms* over 30 m. tall, 15-25 cm. in diameter. often naked at the base, branchy above; nodes hairy; internodes 37-40 cm. long, covered with white, waxy scurf when young. *Culm-sheaths* as broad at the base as at the summit, 25-50 cm. long; glabrous within, clothed without with golden or brown hairs, or glabrescent but rough, caducous; imperfect limb lanceolate, 15-35 cm. long, often recurved, decurrent into two narrow, wavy auricles. *Leaves* large, broadly-lanceolate, rounded at the base, cuspidate-acuminate, ending in a twisted point, 30-50 cm. long, 10-11 mm. broad, at first hairy, afterward glabrous; sheaths striate, glabrescent, hairy at the throat, with two lateral small auricles; ligule long.

Inflorescence a large panicle with long, slender, curved branches, bearing lax heads of few spikelets, sometimes leafy at the top; heads of spikelets up to 2.5 cm. in diameter. *Spikelets* 12-20 mm. long, ovate-acute, many-flowered, the lowest 2-3 florets reduced to the lemma, the next 2-4 with lemma and palea, sometimes female with more or less aborted stamens, the next 1-2 hermaphrodite the terminal rudimentary. *Glumes* ovate, mucronate, striate; lemma of the female flowers convex on the back, mucronate, many-nerved, clothed with appressed hairs, those of the hermaphrodite flowers flat on the back, shortly acute, spiny; paleas hairy dorsally, acute or cuspidate at the top, 2-keeled, keels long-fimbriate. *Stamens* 6; anthers acuminate-mucronate at the top. *Ovary* long-rostrate; style

simple or bifid. *Caryopsis* oblong, obtuse, 8 mm. long, hairy on the top.

Cultivated in the plains of ASSAM.

7. *Dendrocalamus longispathus* Kurz, Forst. Flor. Burm. II (1877) 561.

A large caespitose bamboo. *Culms* 20 m. tall, naked at the base, leafy above, glaucous or white when young, then turning yellow or yellowish green; internodes 25-60 cm. long, 7.5-10 cm. in diameter. *Culm-sheaths* papyraceous, 35-50 cm. long, 12-17 cm. broad, covered on the back with dense, stiff, appressed brown or black hairs, sides parallel almost to the top; imperfect limb lanceolate-acuminate, recurved, 30-45 cm. long, 25-36 mm. broad, densely hairy on the back; ligule toothed or fimbriate. *Leaves* oblong-lanceolate or linear-lanceolate, acuminate, shortly petioled, glabrous above, rough and glabrescent below, scabrid on the margins; median nerve yellow; sheaths smooth, glabrous, with 2 small auricles; ligule narrow, fringed.

Inflorescence a large panicle or of interrupted spicate clusters of spikelets situated at the nodes of long sinuate branches, bracteolate at the base. *Spikelets* few in each head, few-to many-flowered. *Glumes* 2-3, obovate, blunt; joints of rhachilla short; florets 2-3, fertile; lemmas obovate, rounded, obtuse or truncate, cucullate, many-nerved, ciliate on the margins; palea ovate-truncate, feebly 2-keeled, finely pubescent, with 2 intracarinial nerves. *Stamens* short; anthers yellow, ending in a blackish mucro. *Ovary* broadly ovoid, sometimes acute. *Style* long, hairy, terminating in a short hairy stigma. *Caryopsis* ovoid, crowned by the persistent base of the style.

Very common in SYLHET.

2. PSEUDOSTACHYUM Munro.

Spikelets small, 1-flowered; rhachilla produced ending in a terminal imperfect floret. *Glumes* usually only one, broad, mucronate; lemma similar to the glume; palea much convolute, 2-keeled; lodicules 3-5, persistent. *Stamens* 6; anthers apiculate; ovary rigid; style glabrous; stigmas 2;

caryopsis glabrous, depressed-globose; pericarp crustaceous.

A large shrubby bamboo with single culms from a creeping rhizome; leaves large, glabrous. *Inflorescence* a large leafy panicle of drooping bracteate spikes; rhachis wiry.

Pseudostachyum polymorphum Munro, in Trans. Linn. Soc. XXVI (1868) 142.

A large shrubby bamboo with single culms from a long creeping, jointed rhizome. *Culms* 17 m. tall, thick-walled, smooth; nodes not swollen; internodes 22 cm. long, 35 mm. in diameter, glaucous at first, afterwards dark green. *Culm-sheaths* shorter than the internodes, triangular truncate in outline, very shortly auricled with a tuft of short bristles; imperfect blade long-acuminate on the young culms; short, obscure triangular on the others, striate and furnished with purplish transverse nerves: ligule short, narrowly dentate. *Leaves* oblong-lanceolate, unequally rounded at the base into a short petiole, attenuate at the top into a long twisted point, smooth on both surface, scabrid on one margin; leaf-sheaths faintly white-pubescent, glabrescent; ligule short.

Inflorescence a very large leafy panicle, composed of branches fascicled at the nodes, pendulous or curved. *Spikelets* small, 5 mm. long, with 1 fertile floret; rhachilla produced bearing glumes or an incomplete floret. *Glume* one, broad mucronate, 7-nerved; lemma similar to the glume, finely ciliate above; palea thin, much convolute, 2-keeled, ciliate on the keels. *Lodicules* 3-5, usually 4, large, acute, rounded, or truncate at the apex, ciliate, persistent. *Stamens* 6, free; filaments short; anthers apiculate. *Ovary* narrow, linear-oblong, ending in a rigid style with 2 hairy stigmas. *Caryopsis* globose-depressed, surmounted by the base of the style; pericarp crustaceous. The inflorescence is very often diseased.

This bamboo is common in the ASSAM VALLEY especially at the foot of the NAGA HILLS.

3. TEINOSTACHYUM Munro.

Spikelets many-flowered, cylindrical, long-attenuate at the top, 25-75 mm. long, with an articulate rhachilla which if often visible, the lower 1-2, and the upper 2-4 florets incomplete, sterile, of one lemma only. *Centre* florets, 3-5,

hermaphrodite, with lemma and palea. *Lemma* overlapping at the base, broadest at the middle, attenuate towards the summit, many-nerved; palea 2-keeled, ciliate on the keels. *Lodicules* 3, many-nerved, sometimes concave at the base. *Stamens* six, filaments free; anthers obtuse. *Ovary* very long, attenuate at the top. Fruit bacciform, rostrate with a crustaceous pericarp.

Shrubby or arborescent bamboo. *Culms* thin, straight below, drooping above. *Inflorescence* a spicate panicle on leaf-bearing branches, the spikelets in bracteate verticils.

***Teinostachyum griffithii* Munro**, in Trans. Linn. Soc. XXVI (1868) 143.

A straggling or sub-scandent bamboo. *Culms* erect, arching, 8-16 m. long, verticillately branched from the nodes; internodes 45-65 cm. long, scabrid at the top; walls thin. *Culm-sheaths* 15 cm. and longer, 36 mm. broad, glabrous and shining at the base, covered with appressed white hairs, ciliate on the margins, strongly convolute; imperfect blade 7.5-10 cm. long, reflexed, ovate-acuminate, rounded at the base and prolonged into a large rounded auricle at either side, with long, curved, reflexed bristles on the auricle and base, densely white-shaggy inside, transverse nerves conspicuous; ligule short, pubescent. *Leaves* oblong-lanceolate, 15-25 cm. long, 17-36 mm. broad, rounded at the base into a strong petiole, glaucous below, terminating above in a scabrous, subulate point, scabrid on the margins, glabrous except below and at the base; sheaths striate, keeled, ciliate on the margins, glabrous or covered with appressed pubescence, with two fringed auricles at the throat; ligule short, ciliate.

Inflorescence a leafy (or leafless) panicle bearing at the verticils short spikes or single spikelets, often long, whip-like, with few spikelets on a filiform rhachis. *Spikelets* very narrow, linear, 5-7.5 cm. long, often pedicelled, with 3-5 hermaphrodite florets, with 1 or more sterile both above and below; rhachilla smooth, jointed, swollen at the joints. *Glumes* 1 or 2, 7.5-10 mm. long, narrow striate, ovate-mucronate; lemmas 1.25 cm. long, ovate-acute, mucronate, 9-11-nerved, pubescent, palea somewhat longer, 2-keeled, the keels

edged half way down with a wavy fringe, ciliate near the tip, 4-nerved on either side. *Lodicules* ovate-lanceolate, concave, equal, quite glabrous, 7-9-nerved. *Stamens* exserted; anthers yellow, blunt or emarginate. *Ovary* stipitate, glabrous, ovate, narrowed into a triquetrous beak forming the style, with 2 or 3 white or purplish stigmas. *Grain* obliquely ovoid, glossy, tapering at both ends, ending in a stiff beak.

SIBSAGAR, LAKHIMPUR, KHASI and NAGA HILLS.

4. CEPHALOSTACHYUM Munro.

Spikelets in groups on the branches of the panicle; sterile spikelets often numerous, the fertile 2-flowered, the lower floret with lemma and palea, the upper rudimentary at the top of the prolongation of the rhachilla; glumes 2-4, broad, often long acuminate, sometimes gemmiparous, many-nerved, frequently hairy on the back; lemma of the fertile floret membranous, convolute, acuminate, subulate, often with a short awn; palea convolute, with two approximate keels, often 2-mucronate at the top; nerves often anastomising; lodicules 3, membranous-hyaline, nerved; stamens 6; anthers long; filaments free; ovary stipitate, ovoid; style long, thickened, rigid; stigmas 2-3, short, plumose. *Caryopsis* often rostrate, obovoid, glabrous.

Erect or shrubby bamboos, often climbing. *Culms* slender, stiff; culm-sheaths auricled. *Inflorescence* a terminal globose head, or a panicle of heads with spreading branchlets; heads bracteate, the fertile spikelets usually mixed with many imperfect ones or with empty glumes.

Key to the species of *Cephalostachyum*.

Spikelets in single, terminal, globose heads.

Heads not more than 3.75 cm. in diameter;
leaves rather small.

Palea entire at the apex, anthers blunt. .. 1. *C. capitatum*.

Palea bifid, anthers apiculate. .. 2. *C. pallidum*.

Heads more than 3.75 cm. in diameter;
leaves large.

Culm- and leaf-sheaths not fringed; palea
undivided. .. 3. *C. latifolium*.

Culm- and leaf-sheaths fringed; palea
bifid. .. 4. *C. fuchsianum*.

Spikelets in heads in interrupted, paniculate
 spikes. 5. *C. pergracile*.

1. *Cephalostachyum capitatum* Munro, in Trans. Linn. Soc. XXVI (1868) 139.

Culms semi-scandent, 4-10 m. long, yellow, pendulous over the branches of trees; nodes not prominent; internodes long, often 1 m., 24-30 mm. in diameter with thick walls. *Culm-sheaths* somewhat thin, papyraceous towards the top on young culms, those on the lower nodes thickened, 15-30 cm. long, 50-75 mm. wide, covered on the back with an adpressed, pale brown pubescence, truncate at the top of long sheaths, on the lower concave, with a rounded sinus; imperfect blade long, erect or recurved, covered with white hairs, rounded at the base and decurrent into two small auricles which are sometimes fringed; ligule narrow, toothed. *Leaves* pale-green, whitish beneath, ovate-lanceolate, rounded unequally at the base into a short petiole, prolonged at the top into a twisted, scabrid, setaceous tip, 10-20 cm. long, 25-50 mm. wide, glabrous on both surfaces, scabrid on the margins; sheaths glabrous, shining, fimbriate in the throat with long caducous hairs; ligule short.

Inflorescence a dense, globular, terminal or axillary, brownish head, 25-40 mm. in diameter. *Sterile* spikelets numerous, hidden by shining, scarious scales which are often keeled on the back; fertile spikelets 15-20 mm. long, few, with 1-3 sterile florets at the base. *Glumes* 2, ovate, glabrous at the top or slightly pubescent, with anastomising nerves, tip ending in a scabrous awn. *Lemma* of the fertile floret similar in shape but with a shorter awn; palea as long as the lemma, convolute, thin, 2-keeled, with approximate keels, hairy between the keels, mucronate. *Lodicules* 3, oblong-lanceolate, nerved, obtuse, attenuate and ciliate at the top. *Stamens* 6; anthers emarginate at the top. *Ovary* ovoid, furrowed, glabrous, attenuate into a twisted style, which ends in two hairy stigmas. *Caryopsis* chestnut, smooth, shining, depressed, surmounted by the remains of the style.

KHASI, JAINTIA, NAGA and AKA HILLS at altitudes between 2,000 and 8,000 ft.

2. Cephalostachyum pallidum Munro, in Trans. Linn. Soc. XXVI (1868) 140.

A shrubby bamboo. *Culms* not more than 2 m. tall (fide E.G. Camus). *Culm-sheaths* not known. *Leaves* pale green, ovate-lanceolate, unequally rounded at the base into a petiole 5 mm. long, which is often wrinkled; suddenly narrowed above into a scabrous, subulate point ending in a long hair-like tip, 2·5-12·5 cm. long, 1·25-2·5 cm. broad, glabrous on both surfaces or minutely pubescent below, rough on the margins, which are somewhat cartilaginous; leaf-sheaths striate, ciliate on the margins, ending in a short rounded auricle furnished with a few, very early deciduous cilia; ligule long, sometimes ciliate.

Inflorescence a pale, terminal head about 2·5 cm. in diameter, supported by a leaf and broad, rounded, glabrous, sheath-like bracts, and consisting of many long, aristate, empty glumes or sterile spikelets, with a few exserted fertile spikelets. *Spikelets* 17·5-20 mm. long; empty glumes sessile, or with a few empty bracts at the base, 12·5-15 mm. long, ovate, concave, ending in an awn 5 mm. long, many-nerved, sometimes pubescent on the back below the awn. *Lemma* similar but with a shorter awn; palea as long as the lemma thinner in texture, many-nerved, tessellate, closely 2-keeled, bifid-mucronate at the apex, hairy below the keels and at the tip; rhachilla produced, short. *Lodicules* lanceolate or spathulate-lanceolate, 3-5-nerved, minutely papillose. pubescent, ciliate at the tip. *Stamens* exserted; filaments long; anthers long apiculate. *Ovary* ovoid-lanceolate; style conical; stigmas 2, hairy. *Caryopsis* chestnut, glabrous, ovoid-globose.

KHASI HILLS, MISHMI HILLS, PATKAI RANGE and MANIPUR, ascending to 5,000 ft.

3. Cephalostachyum latifolium Munro, in Trans. Linn. Soc. XXVI (1868) 140.

A small scrambling bamboo. *Culms* 2-3 m. tall, dark green in colour, whitish below the nodes. *Culm sheaths* thin, papyraceous, straw-coloured, 15-22 cm. long, 50-75 mm. wide, not attenuate but rounded at the top into a concave sinus,

furnished with 2 small, triangular, erect auricles; imperfect blade 10-12·5 cm. long, 8-12 mm. broad, acuminate-subulate, somewhat attenuate at the base; ligule broad. *Leaves* very broad, ovate or ovate-lanceolate, oblique at the base or rounded and abruptly narrowed into a short petiole, ending above in a scabrid, setaceous point. *Sheaths* striate, ciliate, ending in an emarginate callus, rounded at the top; ligule long.

Inflorescence composed of groups of spikelets in globular heads 5 cm. in diameter, at the tips of leafy branches; some spikelets sterile, some fertile seated in the axils of broad keeled bracts. *Spikelets* 1-flowered, acuminate, long-aristate, 12-20 mm. long; glumes 14 mm. long, ovate-lanceolate, long-aristate, glabrous except on the keel, striate, somewhat keeled. *Lemma* lanceolate-acuminate, with a shorter arista and anastomosing nerves; palea membranous, tessellately nerved, rounded at the summit, convolute. *Lodicules* ovate-lanceolate or spatulate, ciliate, 3-nerved, pubescent. *Stamens* exserted; filaments long; anthers mucronate at the apex. *Ovary* ovoid, attenuate into a long flattened style, with 2 short plumose stigmas. *Grain* blackish-brown, shining, broadly ovoid, grooved, terminated by the persistent base of the style surrounded by the persistent lemma palea and lodicules.

NAGA HILLS and MANIPUR, 7,000 ft.

4. *Cephalostachyum fuchsianum* Gamble, Bamb. Brit. India (1896) 107.

A medium-sized, arborescent, semi-scandent bamboo. *Culms* thin walled, soft, pale, verticillately branched from the nodes. *Culm-sheaths* thin, striate and reticulately veined at the edges, sides nearly parallel, rounded at the top on each side into a deep (often 2·5 cm. deep and 1·25 broad at the bottom) concave, long-bristly-fringed sinus, 30 cm. long by 10 cm. broad, clothed on the back with appressed light brown pubescence; imperfect blade inserted at the base of the sinus, reflexed, subulate, 15-20 cm. long, 17·5-20 mm. broad, closely pubescent below; ligule small. *Leaves* large ovate-lanceolate, angled or rounded at the base with a long (12·5-15 mm.) petiole, cuspidately acuminate, ending in a scabrous twisted point, glabrous on both surfaces, scabrous on the margins;

leaf-sheath soft, dark green, striate, thickly long-ciliate on the edges ending in a rounded callus and produced at the top into an elongated auricle thickly clothed with stiff, white bristles; ligule moderately long, ciliate.

Inflorescence a dense, globular, terminal head, 3.25 cm. in diameter, or else an elongated, densely packed, terminal, congested spike of superposed heads, consisting of many, fertile spikelets among empty, aristate bracts or sterile, smaller spikelets. *Spikelets* elongate, 2-2.5 cm. long, glabrous. *Glumes* 15-17.5 mm. long, ovate at the base, long-scabrous-aristate above, glabrous, striate, 17-19-nerved; lemmas similar, but more elongate and more shortly aristate, 21-23-nerved, tessellate; palea rather longer than the lemma, thin, ovate-lanceolate, bifid at the apex, mucronate-tipped, pubescent, 2-keeled, keels close together, 5-6-nerved; rhachilla produced, short. *Lodicules* linear-lanceolate or spatulate, blunt, 3-5-nerved, minutely ciliate above and papillose on the sides. *Stamens* long-exserted, pendulous; anthers sharply apiculate or forked at the tip. *Ovary* narrowly ellipsoid; style thick; stigmas 2, short. *Caryopsis* chestnut-brown.

DAPHLA HILLS; NAGA HILLS near Birema. Flowered in the Naga Hills in 1935. The caryopses were produced in great numbers and were collected in large quantities by the Kacha Nagas and used as food.

5. *Cephalostachyum pergracile* Munro, in Trans. Linn. Soc. XXVI(1868) 141.

A deciduous, arborescent, tufted bamboo. *Culms* erect, glaucous-green, somewhat whitish-puberulous below the nodes, 10-13 m. tall, 5-7.5 cm. in diameter; nodes scarcely thickened; internodes 30-45 cm. long, walls very thin. *Culm-sheaths* much shorter than the internodes, 10-15 cm. long, 15-20 cm. broad, densely covered with black, stiff, deciduous hairs, afterward polished, chesnut-brown; imperfect blade 5 cm. long, ovate, cordate, cuspidate, densely hairy within, decurrent into a wavy fringe bordering the top of the sheath and ending on either side in a rounded auricle; both fringe and auricle edged with long, stiff, curved, white bristles; ligule very narrow entire. *Leaves* variable, linear-lanceolate, 15-35

cm. long, by 2·5-3·25 cm. wide, or even 6·25 cm., thin, rounded or cuneate at the base into a short petiole, terminating above in a subulate, scabrous, acuminate point, rough on the margins and on the surfaces, glaucescent beneath; leaf-sheaths glabrous, faintly striate, ending in a small, ciliate callus, auricled at the mouth with a few, early-caducous cilia; ligule very narrow, entire.

Inflorescence a large panicle with verticils of long drooping, filiform spikes bearing distant broad heads of spikelets supported by small, chaffy, sheathing bracts; rhachis very slender, wiry, 3·25-5 cm. between the clusters. *Spikelets* in bracteate clusters, 1·25-1·75 cm. long, without glumes, but 1-2 sterile florets, followed by a fertile floret, ending in a terminal sterile floret or filiform, produced-rhachilla. *Lemma* 1·25-1·75 cm. long, ovate-lanceolate, many-nerved, densely pale-hairy, long-mucronate; palea as long, 2-keeled, the keels close together, ciliate, apex deeply bifid, mucronate. *Lodicules* 2, narrow, lanceolate, obtuse and ciliate at the tip 3-5-nerved, persistent. *Anthers* purple. *Ovary* smooth, sub-globular; style 3-cornered; stigmas 2-3, stout, recurved. *Caryopsis* obovate-oblong, shining, 1·25 cm. long, furrowed on one side, ending in a beak 1·25 cm. long.

Plains of ASSAM, SIBSAGAR, LAKHIMPUR. Flowered in Dibrugarh in 1936.

5. NEOHOUEAUA A. Camus.

Inflorescence an elongate panicle. *Fertile* spikelets 1-flowered; glumes 3-4, mucronate, often gemmiparous; lemma involute, mucronate, subaristate; palea elongate, involute, without keels, 2-aristate at the top; lodicules 0 or very small. *Stamens* 6, filaments connate; anthers obtuse at the apex. *Ovary* oblong; style long; stigmas 3, exserted.

Medium-sized bamboos with culms growing in large tufts, often somewhat scandent, unarmed.

Key to the species of *Neohouzeaua*.

Branches erect; panicle spiciform.	..	1. <i>N. dullooa</i> .
Panicle of spaced heads.	..	2. <i>N. helferi</i> .

1. **Neohouzeaua dullooa** *A. Camus*, in Bull. Mus. Paris (1922) 100. Syn. *Teinostachyum dullooa* Gamble, Bamb. Brit. Ind. (1896) 101.

A middle-sized bamboo. *Culms* erect, 4-9 m. tall, whitish below the nodes; nodes hardly prominent; internodes 4-1 m. long with thin walls. *Culm-sheaths* varying in size according to the internodes, from 15-30 cm. long and 10 cm. broad, to 30 cm. long and 25 cm. broad, striate, with scattered white hairs, prominent above, rounded at the top, concavely truncate and loose-fringed with stiff bristles; limb narrow, subulate, recurved, hairy within, 7.5-15 cm. long, 8-17 mm. wide at the base; ligule prominent, long-fimbriate. *Leaves* variable, oblong-lanceolate, acuminate, rounded, often unequally, at the base into a short petiole, terminating in a twisted, subulate point, rough on the upper surface, minutely softly pubescent beneath or glabrescent, rough on the margins; sheaths striate, ciliate on the margins; callus ciliate or glabrous; ligule long, hairy.

Inflorescence a panicle with spiciform branches, furnished with long, truncate bracts, with softly hairy, imperfect, caducous limbs. *Spikelets* rather close, few in number, 1.25-2.5 cm. long, slender, cylindrical-fusiform, acute, softly hairy with one fertile floret; glumes 2-4, ovate-acute, long-mucronate, subaristate, the upper resembling an empty lemma. *Fertile floret*, lemma 12-14 mm. long, convolute, acute, subaristate, many-nerved, pubescent at the top; palea convolute, lanceolate, keelless or very obscurely keeled at the top, many-nerved, hairy at the top, terminating in two awns, which are scabrid and 1-1.5 mm. long. *Filaments* connate; anthers obtuse. *Ovary* glabrous; style forming a beak 12-14 mm. long; stigmas short.

Common in both VALLEYS.

2. **Neohouzeaua helferi** *Gamble*, in Kew Bull. (1923) 91. Syn. *Teinostachyum helferi* Gamble, Bamb. Brit. Ind. (1896) 102.

An evergreen, tufted bamboo forming large impenetrable thickets. *Culms* 6-12 m. tall, 2.4-3.6 cm. in diameter; spreading in all directions; internodes greyish to green in

youth, walls thin; nodes somewhat inflated, whitish; culm-sheaths 20-25 cm. long, persistent, thick, brittle when young, bearing a few appressed bristles which leave a scar when they fall, rough towards the base, truncate at the top; imperfect blade nearly as long as the sheath, recurved, lanceolate, acuminate, glabrous or shortly hispid, rounded at the base and decurrent as a very narrow long-fringed band at the top of the sheath; ligule narrow, fringed with stiff hairs. *Leaves* variable, oblong-lanceolate, 15-45 cm. long, 2·5-7·5 cm. broad, unequal at the base, shortly petiole, cuspidate-acuminate, ending in a long, scabrous twisted point, margins rough, glabrous and glaucescent beneath; leaf-sheaths glabrous, smooth, striate, ending in a smooth callus and a short long-fringed auricle; ligule narrow, fringed.

Distant heads of spikelets often up to 5 cm. in diameter, usually less. *Spikelets* paired; glumes 2, 5 and 8 mm. long; lemma 12-25 mm. long; palea convolute. *Stamens* 6; filaments connate. *Caryopsis* over 5 cm. long.

GARO, KHASI and JAINTIA HILLS, 3-4,000 ft.

6. DINOCHLOA Buse.

Spikelets minute, very numerous, in sub-globose sessile heads on short branchlets, 1-flowered; rhachilla short, inarticulate, not produced. *Empty glumes* 1-4, broad, very obtuse, muticous, gradually larger upwards. *Lemmas* similar; palea convolute, equal to, or larger than, the lemma, not keeled. *Lodicules* none. *Stamens* 6, free, short. *Ovary* ovoid, glabrous; style short. *Caryopsis* ovoid-acuminate.

Lofty climbing bamboos, with zigzag culms. *Culm-sheaths* thick, loosely-clasping, wrinkled at the base, where a broad leathery ring remains after the sheath falls. *Leaves* rather large, soft, tessellately nerved. *Inflorescence* a large, compound panicle of thin, spicate clusters of spikelets.

Key to the species of *Dinochloa*.

Culm-sheaths leathery; pubescence golden-brown.	..	..	..	..	1. <i>D. maclellandii</i> .
Culm-sheaths brittle; pubescence white.	..	..	..	..	2. <i>D. compactiflora</i> .

1. **Dinochloa maclellandii** (Munro) Kurz, in Journ. As. Soc. Beng. XLII (1873) 253.

An evergreen, lofty, often scandent bamboo. *Culms* up to 30 m. long, if climbing; shorter and straggling if growing unsupported, 2·5-5 cm. in diameter, zigzag-geniculate, covered by the persistent loose sheaths, grey-green, walls thin; nodes swollen; internodes 15-20 cm. long, often angled when young, scabrous with brown appressed pungent hairs. *Culm-sheaths* cylindrical, the base often dark, leathery persistent, 15-22·5 cm. long, 17·5-22·5 broad at the base, 5·7-5 cm. wide at the top, covered with densely appressed, golden-brown pubescence, ending above in a narrow dark glabrous margin edging the whole of the truncate top outside the base of the imperfect blade; imperfect blade lanceolate-acuminate, rounded at the base and decurrent on to the sheath, 15-30 cm. long, 2·5-6·25 cm. broad, recurved or spreading, glabrous outside, densely brown hairy within; ligule short, entire or faintly serrate. *Leaves* large to very large, broadly oblong-lanceolate, acuminate, unequal at the base, rounded into a short thick petiole up to 1·25 cm. long, ending in an acuminate, setaceous, scabrous, twisted tip; leaf-sheath striate, transversely veined, produced at the mouth into a naked, rounded auricle, keeled at the back, appressed hairy when young, afterwards glabrous; ligule often broad, entire or serrate.

Inflorescence unknown.

CACHAR and SYLHET.

2. **Dinochloa compactiflora** (Kurz) McClure, in Kew Bull. (1936) 251. Syn. *Melocalamus compactiflorus* Benth. in Journ. Linn. Soc. Bot. XIX (1882) 134. Syn. *Pseudostachyum compactiflorum* Kurz, in Jour. As. Soc. Beng. XLII (1873) 252.

An evergreen tufted arborescent bamboo. *Culms* greyish green, rough, scandent, spreading and arching, 5-8 m. and more tall, sometimes even up to 30 m. and climbing over tall trees, up to 2·5 cm. in diameter; nodes thickened; internodes 35-60 cm. long. *Culm-sheaths* persistent, hard, brittle, cylindrical, smooth or covered with long, white, appressed hairs, truncate at the mouth, dilated at the base,

about 15 cm. long by 7.5 cm. broad; imperfect blade as long as or longer than the sheath, recurved, long-acuminate, rounded at the base and then spreading out into a narrow, dark, reflexed, crescent shaped auricle, fringed with stiff bristles, hispidly hairy towards the base; ligule narrow, entire. *Leaves* large, oblong-lanceolate, rounded at the base into a short, hairy petiole, terminating in a subulate, acuminate, penicillate, scabrous, twisted point, scabrous on one margin, 15-25 cm. long by 2.5-5 cm broad; leaf-sheaths striate, appressed white hairy when young, glabrescent, somewhat keeled, truncate at the mouth, furnished with a lunate reflexed auricle fringed with stiff, early caducous bristles; ligule narrow, entire.

Inflorescence a large, compound, interrupted panicle of small, sub-globose heads, bearing several fertile and many sterile spikelets often leaf bearing; the rhachis very pubescent, flexuose, flattened on one side; heads 7.5-12.5 mm. in diameter. *Spikelets* very small, 2.5 mm. long, and as broad, glabrous, blunt or truncate, 2-cleft, with 2 fertile flowers and 1 empty terminal on a produced rhachilla. *Glumes* 2, broadly ovate, ventricose, very shortly mucronate; lemma similar, often ciliate on the edges; palea as long as the lemma, broadly boat shaped, shortly and bluntly 2-toothed, 2-keeled, ciliate on the keels and 4-5-nerved between. *Lodicules* 3, large, ovate, blunt, long ciliate. *Stamens* free; filaments short; anthers yellowish, bluntly acute at the tip. *Ovary* glabrous, ovoid-globose, surmounted by a short thick style; stigmas 2 or 3, short plumose. *Caryopsis* large, sub-globular, 2.5-3.75 cm. in diameter, summit depressed.

CACHAR and SYLHET plains. Used for basket work.

7. MELOCANNA Trinius.

Spikelets 2 to 3, fasciculate in bracts in the axils of the spikes, acuminate, with one fertile and one or more sterile florets. *Empty glumes* indefinite, acuminate, mucronate, striate. *Lemmas* similar to the empty glumes; palea similar, convolute, not keeled. *Lodicules* 2, narrow. *Stamens* 5 to 7; filaments free or irregularly joined. *Ovary* glabrous; style

elongate; stigmas 2 to 4, shortly hairy. *Caryopsis* very large, pea-shaped, long-beaked; pericarp very thick.

Arborescent bamboo, unarmed. *Culms* erect, distant, single from the ramifications of an underground rhizome. *Culm-sheaths* often persistent, brittle, short, with short auricles; imperfect blade very long. *Leaves* broad, petioled, smooth. *Inflorescence* a large compound panicle of spicate, secund spikelets.

Melocanna bambusoides Trin. apud Spreng., Neue Entd. II (1821) 43.

Culms single, distant, green when young, straw-coloured when older, clothed with the persistent sheaths, unbranched till near the top, up to 20 m. tall; nodes marked by a thin ring; internodes smooth, 30-50 cm. long; walls thin. *Culm-sheaths* yellowish-green when young, yellow when old, brittle, striate, covered with whitish appressed hairs, 12·5-15 cm. long, 15-30 cm. broad at the base, straight for two-thirds of the way up then once or twice waved, cut off straight or concavely below the imperfect blade, the edges produced upwards into rounded often long-fringed auricles; imperfect blade up to 30 cm. long, recurved, subulate-acuminate, the base decurrent into a narrow strip along the top of the sheath, ligule very narrow, serrate. *Leaves* lanceolate or oblong-lanceolate with a long, scabrous, twisted point; rounded at the base into a 1·25 cm. long petiole, 15-35 cm. long, 2·5-3·25 or even 7·5 cm. broad, glabrous above, glaucescent beneath and hairy when young, both edges finely ciliate, scabrous on one margin; leaf-sheaths glabrous, smooth, ending in a pointed auricle which bears 10-12 stiff, white, deciduous bristles; margin ciliate; ligule very short.

Inflorescence a large, compound panicle of one-sided, drooping, spicate branches bearing clusters of 3-4 spikelets in the axils of short, blunt, glabrous bracts. *Spikelets* about 1·25 cm. long, glabrous, spinous. *Glumes* 2-4, sometimes gemmiparous, striate, lanceolate, shortly mucronate; lemma similar, but thinner; palea glabrous, convolute, mucronate, acuminate, not keeled. *Lodicules* 2, narrow, linear-oblong, obtuse and erose-fimbriate at the top, 3-5-nerved. *Stamens*

free at the base or irregularly joined; anthers yellow, notched at the apex. *Ovary* ovoid; style elongate; stigmas 2-4, recurved, hairy. *Caryopsis* very large, 7·5-12·5 cm. long, obliquely ovoid, fleshy, beak curved; pericarp thick, fleshy.

Very common in the SURMA VALLEY where it is gregarious over very large areas.

8. BAMBUSA Schreber.

Spikelets many-flowered, rarely few-flowered, with imperfect florets at the base or apex. *Glumes* 1-3. *Lemmas* ovate-lanceolate, usually mucronate, many-nerved, usually glabrous, coriaceous-papyraceous; paleas 2-keeled, keels ciliate or not, tips mostly entire. *Lodicules* 3, membranous, obtuse, ciliate. *Stamens* 6; filaments free, often exserted; anthers narrow, tip obtuse or apiculate or penicillate. *Ovary* oblong or obovate, hairy at the apex; style short or long. *Caryopsis* oblong or linear-oblong, acute or obtuse, furrowed on one side; pericarp thin, adherent; embryo conspicuous.

Arborescent or shrubby, or rarely climbing bamboos, sometimes thorny! *Culms* from a thick rhizome, usually caespitose, occasionally stoloniferous. *Inflorescence* usually a large leafless compound panicle.

Key to the species of *Bambusa*.

Culms without spines.

Spikelets cylindric.

Spikelets in loose heads.

Arborescent.

Imperfect blade of culm-sheath triangular from a broad base.

Culm-sheaths with large auricles.

Palea ciliate on the keels.

 Anthers obtuse. .. 1. *B. tulda*.

 Anthers apiculate. .. 2. *B. nutans*.

 Anthers penicillate. .. 3. *B. teres*.

 Palea not ciliate on the keels. .. 4. *B. polymorpha*.

 Culm-sheaths with small auricles. .. 5. *B. pallida*.

Imperfect blade inflated, leaf-tips shaggy. .. 6. *B. khasiana*.

Shrubby. .. 7. *B. nana*.

Spikelets in dense heads, ovate. .. 8. *B. balcooa*.

Spikelets flattened.	..	..	9.	<i>B. vulgaris.</i>
Culms with spines.	..	..	.. 10.	<i>B. arundinacea.</i>
Species with flowers not known.				
Culms scandent; leaves glabrous, leaf sheaths with long bristles.	..	..	.. 11.	<i>B. mastersii.</i>

1. *Bambusa tulda* Roxb., Hort. Beng. (1814) 25.
 Local names :—*Mirtinga* (Sylhet); *Wati* (Garó); *Wamuna*, *Wagi*, *Nalbans*, *Deobans*, *Bijli* (Assam); *Tulda*, *Jowa* (Beng).

A tufted bamboo; culms reaching a height of 22 m., 5-10 cm. in diameter, hollow, smooth, green, sometimes striped with yellow. *Lower* branches leafless, rigid, horizontal. *Culm-sheaths* 15-22 cm. long, by 15-25 cm. broad, smooth or covered with appressed white or brown hairs; slightly attenuate upwards and rounded or triangularly truncate at the top; imperfect blade broadly triangular reniform or cordate, cuspidate, erect, hairy within, the base decurrent into rounded, large, long-fringed auricles, or a wavy narrow-fringed band along the upper edge of the sheath; ligule narrow, entire. *Leaves* linear-oblong or lanceolate, rounded or cordate at the base, 11-32 cm. long, 17-37 mm. broad; upper surface and margins rough; sheaths striate, glabrous, ending in a smooth callus and on oblong rounded auricle, from which spring long white bristles; ligule narrow.

Inflorescence variable, usually a gigantic, leafless panicle but sometimes very short; branches spicate, bearing interrupted clusters of few (1-5) usually fertile long spikelets. *Spikelets* cylindrical at first then a little compressed, 2.5-7.5 cm. long, 7-10-12-flowered, often hirsute at the top, 1-2 empty bracts at the base, than several glumes. *Lower* 1-2 and upper 2-3 florets imperfect, male or female. *Central florets* hermaphrodite; lemmas smooth, shining, acuminate, somewhat membranous at the base, 25 mm. long; palea a little shorter or equal to the lemma in length, 2-keeled, keel ciliate, 5-7-nerved between the keels; rhachilla clavate, flattened, glabrous except on the ciliate tip, articulate. *Lodicules* 3, 2 obtuse, the third lanceolate, hyaline, fimbriate. *Stamens* 6, rarely 3 by abortion, exserted, mucous or obtusely mucronate. *Ovary* stipitate, obovate, hairy on the top, short-

styled; *stigmas* 3, plumose. *Caryopsis* oblong or obovate, hirsute on the top.

Very common in the ASSAM VALLEY where it is much used for building and scaffolding, and for making mats and baskets.

2. *Bambusa nutans* Wallich apud Munro, in Trans. Linn. Soc. XXVI (1868) 92. Local names : *Peechli* Sylhet; *Jotia-makal*, *Deobans*, Assam; *Seringjai*, Khasi.

Very similar in habit to *B. tulda* Roxb. *Culms* green, smooth, not shining, white-ringed below the nodes, 7-14 m. tall, 4-8 cm. in diameter. *Internodes* 36-45 cm. long. *Culm-sheaths* 15-22 cm. long, covered on the back with appressed and scattered black hairs, the base bearing a ring of soft deciduous hairs; imperfect blade of the lower and upper sheaths 15-21.5 cm. long and very broad, that of central nodes shorter, acute, margins recurved, clothed within with appressed black hairs, decurrent into large waved auricles which bear long curved bristles; ligule short, dentate. *Leaves* linear-lanceolate, 15-30 cm. long, 2.5-3.75 cm. broad, rounded or attenuate at the base into a short petiole; tip a twisted scabrid point; margins scabrous; secondary veins 7-10, intermediate 8-9, pellucid glands frequent; leaf sheaths striate, hairy when young, produced into a falcate auricle with a few long bristles; ligule long, obtuse hairy.

Inflorescence similar to that of *B. tulda*. *Spikelets* 2.6-5 cm. long with few fertile florets, densely verticillate, sterile spikelets many. *Rhachilla* long, visible, articulate. *Glumes* 2 or 3, hermaphrodite florets 3-5, followed by 2-3 imperfect florets at the top. *Lemma* of the hermaphrodite florets up to 2.7 cm. long, acute or mucronate, ovate, many-nerved, minutely hairy within : palea flattened, ovate, 2-keeled, the keels covered with long white hairs. *Lodicules* 3, broad, obtuse, long-fimbriate. Stamens 6; anthers long spiculate or narrowly penicillate at the summit. *Ovary* stipitate, obovate, pubescent, on the top. *Style* short, pubescent; *stigmas* 2-3, almost glabrous or plumose. *Caryopsis* oblong, obtuse, hairy on the top.

Without flowers it is extremely difficult to separate this bamboo from *B. tulda*. It is fairly common in the ASSAM VALLEY.

3. *Bambusa teres* Ham. ex Wall., Cat. 5026 B.

A densely caespitose bamboo. *Culms* up to 30 m. tall, dark green, smooth, 7.5 cm. in diameter; nodes ringed by the bases of the fallen sheaths; internodes 50 cm. long, walls 8-10 mm. thick. *Culm-sheaths* 20-25 cm. long, equally broad, nearly glabrous, hardly attenuate upwards, somewhat rounded on top; imperfect blade 10-15 cm. long, broad, triangular, cuspidate, appressed hairy beneath, rounded at the base, and then again decurrent in broad wavy auricles fringed with a few deciduous bristles; ligule narrow, white-hairy outside. *Leaves* oblong-lanceolate, 30-35 cm. long, 40-45 mm. wide, unequal at the base and attenuate into a short petiole, long acuminate, ending in a setaceous point, glabrous above, pubescent beneath; margins rough; leaf sheaths glabrous or slightly hairy, truncate at the mouth; ligule short.

Inflorescence a large compound panicle with spicate branches bearing groups of fertile and sterile spikelets with chaffy bracts. *Fertile* spikelets up to 5 cm. long, dull, 7-8-flowered, of which the upper two are often imperfect; rhachilla striate, often ciliate at the top. *Glumes* ovate, mucronate. *Lemmas* of the male spikelets many-nerved, long acuminate, tip occasionally foliaceous; palea ovate-acute, scaberulous, 5-6-nerved between the scabrid or ciliate keels, long hairy at the top. *Lodicules* many-nerved, long-fimbriate. *Anthers* narrow, penicillate. *Ovary* obovate, very hairy on top, beaked; style-short; stigmas 3, hairy, long.

DARRANG. The stems are stated to be of little value as they are readily attacked by insects.

4. *Bambusa polymorpha* Munro, in Trans. Linn. Soc. XXVI (1868) 98. Local names :—*Betua*, *Jama*, Bengali.

A tall, tufted bamboo. *Culms* 20-27 m. tall, usually evergreen, but occasionally losing their leaves during the dry season, unarmed, curving at the top; nodes prominent; internodes 7.5-15 cm. in diameter, 30-60 cm. long, greyish-green in colour, covered with a white scurf when young. *Culm-sheaths* thick, coriaceous, shining with a few hairs within,

covered on the back with a dense, white appressed pubescence, attenuate towards the top; imperfect blade sub-reniform, concave, cuspidate, rounded at the base and widening in a long auricled band, produced beyond it into two falcate auricles, the whole being fringed with long stiff bristles; ligule narrow, entire. *Leaves* thin, linear-lanceolate, attenuate or rounded at the base into a short petiole, long acuminate at the tip, 10-18 cm. long, 10-16 mm. broad, rough on the upper, hairy on the lower surface, margins scabrous; sheaths compressed, striate, hairy, ending in a callus and a minute auricle furnished with a few long deciduous bristles; ligule very short.

Inflorescence a much-branched panicle, with curving racemes of frequent heads, bearing few spikelets surrounded by brownish, glabrous, mucronate, chaffy bracts; rhachis smooth, the upper part covered with white appressed pubescence, wiry. *Spikelets* shining, often brownish, 10-12·5 mm. long, in lower heads 5-6, number gradually decreasing upwards, somewhat pedicellate and enclosed in a long, curved, glabrous bract. *Empty* glumes 1-3, ovate-mucronate, then 2-3 fertile flowers, then a terminal imperfect flower; rhachilla produced, long, flattened, glabrous; lemmas ovate-mucronate, many-nerved; paleas somewhat longer, lanceolate, acute at the top, keels not ciliate. *Lodicules* 3, sub-obicular, short-fimbriate, 3-5-nerved, one smaller than the other two. Anthers purple, obtuse, sometimes apiculate. *Ovary* obovate, hairy at the top; style with 3 short white-hairy stigmas. *Caryopsis* ovate, 5 mm. long, depressed, flattened on one side, hairy above, ending in a short hairy mucro.

Found in SYLHET.

5. *Bambusa pallida* Munro, in Trans. Linn. Soc. XXVI (1868) 97. Local names:—*Makal* Assam; *Burwal* Cachar.

A caespitose bamboo growing in thick clumps. *Culms* smooth, fistular, 12-20 m. tall, 5·4-7·5 cm. in diameter, olive-green in colour; internodes 50-80 cm. long, walls thin. *Culm-sheaths* 17·5-30 cm. long, by 25 cm. broad, straight-

truncate at the top, glabrous or covered with appressed white hairs when young; imperfect blade very long, usually longer than the sheath, up to 35 cm., triangular-acuminate from a broad base, furnished with small round auricles, the auricles and lower parts fringed with bristles, sparsely black-hairy without, glabrous or slightly hairy within; ligule very narrow. *Leaves* linear-lanceolate, 10-20 cm. long, 1-2 cm. broad, rounded at the base into a short petiole, ending in a subulate, twisted point; leaf-sheaths glabrous, striate, ending in a rounded, erect auricle with a few long bristles; ligule very short.

Inflorescence a large branching, very pale panicle, with spicate branches bearing heads with many sterile and few fertile spikelets, pale, cylindrical; sterile 7-11 mm. long, the fertile 25-30 mm., often curved. *Glumes* two, ovate, acute. Lowest lemma hermaphrodite or male often gemmiparous, followed by 3-8 hermaphrodite and then 3-5 more or less incomplete florets; rhachilla short, club-shaped, ciliate at the top. *Lemmas* ovate-acute, mucronate, many-nerved, glabrous, pubescent within; palea much shorter, acute, 2-keeled, shortly ciliate on the keels, 3-5 intramarginal nerves. *Lodicules* 3, oblong or narrowly obovate, long-fimbriate. *Ovary* narrowly oblong, attenuate upwards into a thickened hairy style; stigmas three, plumose.

Common in both VALLEYS and ascends in the hills to 4,000 ft.

6. *Bambusa khasiana* Munro, in Trans. Linn. Soc. XXVI (1868) 97.

Culms 10-13 m. tall, growing singly from a creeping rhizome; internodes 12-30 cm. long, covered during youth with glistening golden hairs and variegated with transverse blotches, dark olive-green, 12-36 cm. long; walls thin. *Culm-sheaths* 12-15 cm. long by 10-12 cm. broad, striate, covered with dense, tawny, appressed hairs, straight, truncate at the top; imperfect blade as long as or longer than the sheath, narrow (2.5 cm.) at the base, centre portion thickened, cuspidately acuminate, the sides widened out into large, inflated, membranous wings, broadly rounded on the sheath;

ligule very short. *Leaves* membranous, pale, 10-16 cm. long by 20-25 mm. broad, lanceolate, rounded at the base into a short petiole; leaf-sheaths glabrous, striate, minutely auricled with a few long deciduous hairs; ligule-elongate, truncate.

Inflorescence an ample panicle made up of branches bearing distant sub-verticillate groups of spikelets, of which many are sterile. *Fertile spikelets* 17-22 mm. long, at first cylindrical, afterwards compressed, glabrous, 5-6 flowered, the lower hermaphrodite the upper 1-2 imperfect, sterile, rhachilla striate, smooth, fimbriate at the top. *Glumes* short, ovate, mucronate, brown on the margins, glabrous, median nerve strong. *Lemmas* similar to the glumes; 11-13-nerved, glabrous; palea equalling the lemma or longer, 2-keeled, ciliate on the keels. *Lodicules* ovate-orbicular, many-nerved, shortly fimbriate. *Stamens* with obtuse anthers. *Ovary* linear-oblong; style short; *stigmas* 3, long, plumose.

KHASI HILLS and MANIPUR.

7. *Bambusa nana* Roxb., Hort. Beng. (1814) 25.

A very thick, evergreen, caespitose shrub. *Culms* 2-3 m. tall by 3·0 cm. in diameter, glabrous, smooth, green when young, then yellow, hard, much-branched from the base; branches fasciculate, nodes thickened; internodes 20-40 cm. long. *Culm-sheaths* green at first, then yellow, stiff, glabrous, 10-15 cm. long, 5·7-5 cm. broad, rounded at the top; limb linear, acuminate, decurrent at the base into two indistinct, ciliate auricles, hairy on both surfaces; ligule narrow. *Leaves* mostly small, 2·5-7·5 cm. long, 5-7 mm. broad, rounded at the base into a short petiole, narrowed above into a subulate, twisted point; ligule short.

Inflorescence a rather short, diffuse, leafy panicle, with few spikelets, solitary or clustered. *Spikelets* 1·25-3·75 cm. long, glabrous, straw-coloured, bearing 5 or more florets separated by rhachilla joints 2-5 mm. long, the terminal floret imperfect. *Glumes* absent or rarely only one. *Lemmas* 16-20 mm. long, ovate-acute, many-nerved, glabrous; palea shorter, many-nerved, 2-keeled, minutely ciliate at the top. *Stamens* long-exserted, pendulous; anthers obtuse or shortly

apiculate, yellow. *Ovary* obovate, pubescent at the top; *style* very short; *stigmas* long, plumose. *Caryopsis* elliptic in shape, furrowed, shortly hairy at the top, crowned with the base of the style.

Frequently cultivated as a hedge in tea gardens.

8. *Bambusa balcooa* Roxb., Hort. Beng. (1814) 25.

Local names :—*Baluka*, Assam; *Sil Barua*, *Teli Barua*, Sylhet.

A tall, stout, densely caespitose bamboo. *Culms* up to 16-24 m., 7·5-15 cm. in diameter, the lower nodes giving off leafless hard branches; internodes 20-45 cm. long; nodes swollen with a whitish ring above, hairy below. *Culm-sheaths* of two kinds; the lower short and broad, densely appressed hairy on the upper surface, ciliate on the edges and the rounded top; imperfect blade short, triangular, decurrent into short, fringed auricles; the upper 25-35 cm. long, 20-25 cm. broad, almost glabrous, truncate; reduced blade 15-20 cm. long, 7·5-10 cm. broad, acuminate, closely hairy below, decurrent at the base on the sheath in a narrow ciliate band. *Leaves* lanceolate, sub-cordate or attenuate at the base, petioled, (petiole hirsute), sometimes long-ciliate at the base, 16-32 cm. long, 12-24 mm. broad, scabrous, shortly hairy below; leaf-sheath striate, appressed white hairy, truncate above with a narrow callus, with a few stiff bristles.

Inflorescence a large, compound panicle, bearing spicate branches with bracteate heads of spikelets; rhachis pubescent. *Spikelets* ovoid-lanceolate, flattened, 9-14 mm. long, 6-8-flowered, the upper and the lower floret sterile, the others hermaphrodite; rhachilla hidden. *Glumes* 0-2, ovate-acute, many-nerved. *Lemmas* membranous, ovate, many-nerved, mucronate, fimbriate on the margins, straw-coloured, at length brown, palea as long as the lemma, ovate-acute, 2-keeled, long ciliate on the keels, with four intracarinal, anastomising nerves. *Lodicules* 3, ovate or obovate, 3-5-nerved, fimbriate. *Stamens* apiculate with a few silky hairs. *Ovary* broadly ovoid, acuminate, hairy; stigmas 3, plumose.

Very common in both VALLEYS of the province where it has a great repute as a durable and strong bamboo.

9. *Bambusa vulgaris* Schrader, in Wendland Collect. Pl. II (1810) 26.

A moderate-sized bamboo with rather distant culms. *Culms* 6-15 m. tall, smooth, 5-10 cm. in diameter, green or striped with yellow lines, polished, shining; nodes hardly swollen, often with a ring of brown hairs; internodes 25-45 cm.; walls thin. *Culm-sheaths* 15-25 cm. long by 17-23 cm. broad, concave at the top, rounded, hairy, often streaked with yellow, ciliate on the margins, glistening smooth within; limb 5-15 cm. long by 10 cm. broad, sub-triangular, acute, hairy on both faces; base decurrent forming two rounded, falciform auricles, which are fringed with wavy stiff bristles. *Leaves* membranous, linear-lanceolate, acuminate or subulate, rounded at the base, shortly petiolate, 15-25 cm. long by 15-40 mm. broad, glabrous or sparsely hairy below, scaberulous on both surfaces; sheaths striate, laxly hairy; auricles round with a few deciduous stiff hairs; ligule short, ciliate.

Inflorescence a large, leafy, compound panicle, bearing spicate branches with heads of spikelets in bracteate clusters of 3-10, the clusters larger at the nodes. *Spikelets* erect, pedicelled, oblong-lanceolate, acute, compressed. *Glumes* 1-2, 6-9 mm. long, ovate-acute, many-nerved, ciliate towards the apex. *Lemmas* 8-15 mm. long, acuminate-cuspidate, attenuate at the base, papyraceous, fimbriate towards the top, 11-19-nerved; paleas 7-14 mm., bluntly acute, 2-keeled, long-ciliate on the keels, faintly 3-nerved. *Lodicules* three, hyaline, unequal in size, two ovate-oblong, the third longer acute, 3-nerved, long-ciliate. *Stamens* exserted, purple; anthers narrow, blunt or apiculate, hairy at the apex. *Ovary* narrowly oblong, hairy; *stigmas* three, short, plumose.

Frequently cultivated and readily recognized by the peculiar yellow stripes on the culms.

10. *Bambusa arundinacea* Willd. Sp. Pl. II (1799) 245. Local names : *Kotoha*, *Kata*, *Koto*, Assam; *Ketua*, *Ketuasi*, Bengali.

A very densely tufted bamboo. *Culms* 16-35 m. tall, bright green, shining, 15-18 cm. in diameter; internodes 45

cm. long, thick, very branchy, branched from the base, often flattened on one side or angular; basal branches horizontal, armed at the nodes with 2-3 recurved spines, bearing few leaves; nodes prominent, the lower rooting. *Culm-sheaths* coriaceous, orange-yellow when young, with dense golden hairs, often striped with green or red, rounded at the top; limb triangular up to 10 cm. long, concave, glabrous outside, clothed on the inner surface with a dense mat of dark-coloured felt; margins decurrent on the sheath, wavy, plaited, long and thickly ciliate, auricle very narrow. *Leaves* 7-18 cm. long, 2-10 mm. broad, glabrous above, hairy beneath, linear-lanceolate or linear, attenuate or subcordate at the base, shortly petioled, acuminate, margins smooth or scaberulous; sheaths very hirsute, then glabrescent.

Inflorescence a very large panicle; branches spicate with a few loose clusters of spikelets, each cluster with about 5 spikelets. *Spikelets* lanceolate, acute, 1.75-2.5 cm. long, sessile, 4-6-flowered, rhachis dull, smooth. *Glumes* 2 or absent, ovate-lanceolate, acutely mucronate. *Lemmas* smooth at the base, acuminate or mucronate, sometimes shortly fimbriate at the top, often entirely glabrous; paleas narrower than the lemmas, somewhat longer, 2-keeled, keels ciliate, rhachilla hardly visible. *Lodicules* 3, two sub-obtuse, the third lanceolate. *Stamens* 6, with yellow anthers, sometimes with an apiculate bristle. *Ovary* elliptic-oblong; style short, glabrous; stigmas 2 or 3, long, plumose. *Caryopsis* oblong, 5-8 mm. long, grooved on one side.

SYLHET and the GARO HILLS.

11. *Bambusa mastersii* Munro, in Trans. Linn. Soc. XXVI (1868) 113. Local name :—*Beti bans*, Assam.

A very small reed-like species, climbing. *Leaves* oblong-lanceolate, 25-30 cm. long, 36 mm. broad, glabrous on both surfaces except towards the base of the median nerve, glaucescent below, attenuate at the base into a short petiole which is sometimes hairy, terminating in a rostrate-acuminate hairy tip; margins rough; median nerve yellow, shining, secondary nerves 10-12 pairs, intermediate 5, tessellate by reason of a reticulation of oblique lines of pellucid glands; leaf-sheaths

striate, ciliate on the margins, covered on the sides with a coat of stiff appressed hairs, fimbriate at the throat, terminating in a narrow callus and short auricles bearing several, stiff, long, folded bristles; ligule very short.

Inflorescence unknown.

Collected by Masters in Dibrugarh.

9. GIGANTOCHLOA Kurz.

Spikelets ovate and rounded or oblong and compressed, with imperfect florets at the summit and at the base; hermaphrodite florets few; glumes 2 or 3; lemmas as in *Bambusa*; paleas in the hermaphrodite florets 2-keeled, ciliate on the keels; lodicules 3-2, rarely more or one or absent. *Stamens* 6, monadelphous; anthers mucronate, penicillate at the apex. *Ovary* often rostrate, more or less hairy above. *Caryopsis* oblong or linear with a membranous pericarp.

Arborescent or climbing bamboos. *Culms* usually robust and bare at the base; sheaths auriculate. Inflorescence a compound panicle.

Gigantochloa macrostachya Kurz, Forst. Flor. Burm. II (1877) 557.

A large evergreen bamboo. *Culms* 10-16 m. tall, 6-10 cm. in diameter, glaucous in youth below the nodes, afterwards dark green in colour; nodes scarcely swollen, hairy; internodes 45-75 cm. long, the lower very short. *Culm-sheaths* short, 12-20 cm. long, broader than long, contracted at the summit but still broad at the throat, hardly ciliate on the margins; imperfect blade almost as long as the sheath, somewhat acuminate, sub-cordate, furnished on both sides with two large, sinuate auricles, which are densely long-ciliate. *Leaves* thin, lanceolate, 16-40 cm. long, 12-50 mm. broad, attenuate or rounded at the base into a short petiole, ending above in a scabrid setaceous point, somewhat scabrid on the marginal nerves, otherwise smooth and glabrous, scabrid on the margins, hairy below; sheaths at first hairy, glabrescent, often keeled, terminating at the throat in a rounded callus with two small lateral auricles, which are ciliate; ligule short.

Inflorescence a very large, leafy panicle, composed of heads of spikelets more or less distichously and alternately spaced on the branches; bracts at the base of the branchlets large, sub-foliaceous. *Spikelets* up to 5 cm. long, acuminate, subulate, narrow, covered in part by the long cilia of the glumes and lemmas, hermaphrodite florets 2-3, terminal barren. *Glumes* 2-3, ovate-mucronate, long-ciliate. *Lemma* of the hermaphrodite florets ovate-mucronate, many-nerved; palea very narrow, 2-keeled, ciliate on the keels, bifid at the top, 2-3 nerved between the keels. *Lodicules* absent. *Filaments* exserted, connate at the base into a short tube; *Stamens* purple, connective produced into a hairy acumen. *Ovary* narrowly ellipsoid, surmounted by a long slender style, ending in a single stigma. *Caryopsis* narrow, linear, mucronate.

LOWER ASSAM.

10. OXYTENANTHERA Munro.

Spikelets narrow, elongate, cylindrical or conical, often curved; bearing 1-3 florets, the uppermost usually fertile; rachilla very short; glumes 1-3; lemmas ovate, elongate, mucronate; palea of the lowest floret 2-keeled, that of the upper floret convolute or scarcely keeled; lodicules absent. *Stamens* 6, monadelphous, exserted, tube at first thick, short, afterwards elongate, membranous; anthers narrow, acute, apiculate; ovary ovoid; style slender; stigmas 3.

Arborescent or climbing bamboos. *Rhizome* thick, creeping or stoloniferous. *Inflorescence* a large panicle with spicate heads of few or many spikelets.

Key to the species of *Oxytenanthera*.

Cilia of glumes black or purple.	..	1. <i>O. nigrociliata</i> .
Cilia of glumes white.	..	2. <i>O. albo-ciliata</i> .

1. *Oxytenanthera nigrociliata* Munro, in Trans. Linn. Soc. XXVI (1868) 128.

An arborescent bamboo, evergreen, living in colonies. *Culms* 10-15 m. tall, caespitose, erect, robust, striate; floriferous branches fascicled at the nodes, up to 1 m. in length; internodes 40-70 cm. long, 5-10 cm. in diameter. *Culm-*

sheaths 15-40 cm. long, rounded-truncate at the top, densely hairy on the back with hairs caducous in the middle line, leaving two hairy regions on either side, margins ciliate; imperfect blade triangular or lanceolate, shorter than the sheath; auricles bright green, rounded, naked, hairy within; ligule narrow, faintly toothed. *Leaves* lanceolate, attenuate at the base into a short petiole, ending in a subulate twisted point, 18-35 cm. long, 3-5.5 cm. broad, somewhat scabrous above, paler below, a little hirsute at first, afterwards glabrous, tessellately nerved; leaf-sheaths stiff, hairy, glabrescent, smooth, ciliate at the edges, terminated by two small thick auricles.

Inflorescence a very large leafy decomposed panicle of spicate verticils; verticils about 2-3 cm. apart, consisting of 3-6 spikelets, some fertile, some sterile. *Fertile spikelets* narrow, cylindrical, lanceolate, 1.25-3 cm. long, ciliate with black hairs, 5-7-flowered, the lower 2-3 imperfect, the middle one hermaphrodite, the upper imperfect. *Glumes* 1-3, ovate-acute, mucronate, many-nerved, ciliate on the margins with brown, black or purple hairs; lemmas of the fertile florets lanceolate, acuminate, long-mucronate, ciliate on the margins at the top with brown or violet hairs, many-nerved; paleas as long as or shorter than the lemma, narrow, obtuse, acute or mucronate, 2-keeled, ciliate on the keels, 2-3 intracardinal nerves; lodicules absent. *Stamens* 6, long-exserted, monadelphous; tube finally 1 cm. long or longer, anthers 6-8 mm. narrow, purple, ending in long hirsute points. *Ovary* narrow, ovoid, acuminate, pubescent; style long; stigmas short; plumose. *Caryopsis* cylindrical, linear-oblong, truncate, furrowed, 14 mm. long, hairy on the top.

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2. *Oxytenanthera albo-ciliata* Munro, in Trans. Linn. Soc. XXVI (1868) 129. Local names :—*Kalia* or *Kalisundi*. Sylhet.

An arborescent bamboo, often gregarious, evergreen or deciduous. *Culms* densely tufted, 7-10 m. tall, hispid at the summit; nodes oblique, internodes 15-35 cm. long, by 1.5-2.5 cm. in diameter; walls 6-8 mm. thick. *Culm-sheaths*

thick, hard, 10-20 cm. long by 15 cm. broad, at first covered with tawny appressed hairs, afterwards smooth, folded and coriaceous at the base, somewhat truncate; limb oblong-lanceolate, about as long as the sheath, acuminate, broad and rounded at the base and decurrent; ligule long, truncate. *Leaves* linear-lanceolate, rounded at the base, shortly petioled, long-setaceous, 15-20 cm. long, 2-2.5 cm. broad, glabrous above, scabrid on one or both margins; leaf sheaths smooth, striate; ligule long, sparsely ciliate.

Inflorescence a spreading, compound panicle. *Spikelets* in sub-verticillate groups, placed laterally and alternately on the floriferous branches, having yellow, ciliate scales at the base. *Spikelets* 18-20 mm. long, pale, narrowly cylindrical, often curved, composed of two glumes, one male floret, with a (sometimes) hermaphrodite, no imperfect florets at the top. *Glumes* ovate-acute, white-ciliate. *Lemma* elliptic or ovate, acute or feebly emarginate, convolute, many-nerved, white-ciliate; palea shorter, often much shorter, ovate-obtuse, 2-keeled, ciliate on the keels, that of the upper floret not keeled, convolute, ciliate at the top. *Stamens* long exserted; anthers yellowish-green, long hirsute-apiculate. *Ovary* narrowly ovoid, long acuminate, pubescent; stigmas two. *Car-yopsis* elongate, oblong, cylindrical, acuminate, beaked.

SYLHET.

11. ARUNDINARIA Michaux.

Spikelets divaricate-racemose. *Glumes* indistinctly tessellate, lower subaristate; stamens 3; style 1; stigmas 3, sub-plumose.

The genus *Arundinaria* has been split up into several genera by Japanese botanists. The true *Arundinaria* grows in North America as pointed out by Nakai in Journ. Arn. Arbor. VI (1925) 189. He considers that, when the flowers of the species below become known, *A. hirsuta* and *A. rolloana* will be found to be species of *Arundinaria*, but that it is impossible to conjecture the correct genus of the remaining two species.

Key to the species of *Arundinaria*.

Flowers not known.

Culm-sheaths short, imperfect blade recurved.

Leaves with conspicuous veinlets.

Culms caespitose. .. 1. *A. hirsuta*.

Culms distant. .. 2. *A. rolloana*.

Leaves without transverse veinlets. .. 3. *A. suberecta*.

Culm sheaths very long, imperfect blade

erect, very long. .. 4. *A. mannii*.

Flowers known.

Leaves with conspicuous veinlets, tall. .. 5. *A. maling*.

1. *Arundinaria hirsuta* Munro, in Trans. Linn. Soc. XXVI (1868) 30.

A small shrubby bamboo with single stems from the rhizome. *Culms* greyish-green, 1·2-2·4 m. tall, 5·7-5 mm. in diameter, nodes glabrous, raised; internodes up to 32·5 cm. long, often strigosely hirsute above, walls rather thin. *Culm-sheaths* papery, about 15 cm. long and 2·5 cm. broad at the base, striate, covered with long, brown hairs, rounded at the top and ending in large, recurved, long-ciliate auricles; imperfect blade subulate, acuminate, recurved; ligule narrow, pubescent. *Leaves* oblong-lanceolate, 7·5-12·5 cm. long, 12·5-17·5 mm. wide, rounded at the base into a short petiole, terminating above in a subulate, twisted, scabrous point, smooth above, pale and strigosely white hairy beneath, edges cartilaginous and scabrous, serrate; leaf-sheaths striate, covered with long, stiff bristles, ending in a hairy callus, and rounded reflexed auricle, bearing long, stiff, almost spinescent, hairy bristles; ligule elongate, often dark-coloured.

Inflorescence unknown.

Forms large stretches beyond Japvo, NAGA HILLS, at 9,700 ft.

2. *Arundinaria rolloana* Gamble, Bamb. Brit. Ind. (1896) 24.

A shrubby bamboo with stoloniferous distant culms, the rhizomes at first covered with shining, acute, glabrous scales, afterwards jointed, the joints about 1·25 cm. long. *Culms* 2·4 m. tall, 2 cm. in diameter, slightly rough, green at first,

afterwards yellow, somewhat flattened on one side; nodes swollen, lower rooting; internodes 20-30 cm. long, walls rather thin. *Culm-sheaths* 10-15 cm. long, 2.5-5 cm. broad, at first covered with scattered appressed bristles, afterwards glabrous, shining, ciliate on the edges, narrowed convexly in the upper third into a rather broad, truncate mouth, which is furnished with long, recurved, rounded, falcate auricles with long bristles; imperfect blade 3.75-5 cm. long, narrow, subulate, recurved; ligule narrow. *Leaves* 15-20 cm. long, by 2.5-3.75 cm. broad, oblong-lanceolate, rounded at the base into a short, very broad petiole, terminating above in a rather short, acute point, smooth above, sparsely hairy beneath; margins cartilaginous, spinulose-scabrous; leaf-sheaths striate, sparsely strigose, hairy, ending in a narrow line and a rounded, long-ciliate auricle; ligule long, membranous, deeply cleft.

Inflorescence unknown.

NAGA HILLS, 5-7,000 ft.

3. *Arundinaria suberecta* Munro, in Trans. Linn. Soc. XXVI (1868) 32.

A graceful, erect, wiry shrub, growing in thick clumps. *Culms* 3-5 m. tall, 7.5 mm. in diameter, olive-green, smooth; nodes slightly swollen; internodes 15-25 cm. long, cavity very small; branches in whorls from the nodes. *Culm-sheaths* 5-15 cm. long, 1.25 cm. broad at the base, thin, papery, striate, glabrous, gradually attenuate upwards to a naked or fimbriate mouth; imperfect blade subulate, leafy, 1.25-3.75 cm. long, recurved; ligule long, fimbriate at the tip. *Leaves* narrow, linear, 5-10 cm. long, 5-7.5 mm. broad, narrowed at the base into an extremely short petiole, setaceous at the tip; margins scabrous, serrate, revolute, smooth above except the scabrous marginal nerves, pale beneath; leaf-sheaths striate, loose, glabrous or slightly hairy when young, ending in a callus and somewhat produced, with a few deciduous bristles; ligule rather long, pubescent.

Inflorescence unknown.

KHASI HILLS, 4-5,000 ft.

4. *Arundinaria mannii* Gamble, Bamb. Brit. Ind. (1896) 26.

A slender, graceful, tufted, climbing, wiry bamboo. *Culms* solid, 1.25 cm. thick 10 m. tall, branchy; nodes thickened, bearing many geniculate branches; internodes 1 m. long, smooth. *Culm-sheaths* 30-45 cm. long, convolute, apparently persistent, very thin and slender, 5-7.5 mm. broad at the top, rough with sparse, stiff, brown, appressed bristles; imperfect blade inserted on the sheath, continuous, very long, 22.5-25 cm., linear, ending in a long setaceous point, closely appressed hairy within at the base; ligule narrow, dentate. *Leaves* 15-22.5 cm. long, 17.5-25 mm. broad, thin, papery, lanceolate, rounded or attenuate at the base into a short wrinkled petiole; the tip at first thickened and scabrous hirsute, then surmounted by a long, setaceous apex; surfaces smooth above except the scabrous points on the marginal nerves, somewhat glaucous and sparsely rough hairy beneath, scabrid on one margin; leaf-sheaths glabrous, striate, ending on one side in a round shining callus without an auricle, on the other side in a short pointed auricle with a few long stiff bristles; ligule small, hairy, ciliate.

Inflorescence unknown.

JAINTIA HILLS, 3,000 ft.

5. *Arundinaria maling* Gamble, in Kew Bull. (1912) 139.

An erect shrubby bamboo, 3-9 m. tall, emerging in distant culms from a thick rhizome. *Culms* slender, erect, fistulose; internodes 30-40 cm. long, scabrid above, 2-3 cm. in diameter. *Culm-sheaths* chartaceous-coriaceous, striate, sparsely yellowish-hispid without, margins ciliate, up to 30 cm. long, 10 cm. broad, attenuate at the top, broadly auricled, auricle furnished with long, patent, rigid cilia; imperfect blade subulate, 6-7 cm. long, erect or reflexed, scabrid within; ligule 1 cm. long, fimbriate. *Leaves* chartaceous, linear-lanceolate, attenuate at the base into a short petiole, terminating above in a setaceous-acuminate point, glabrous on both surfaces, margins minutely scabrid, 5-10 cm. long, .8-2 cm.

broad; sheaths striate, glabrous except for a few cilia at the mouth and on the back; ligule pubescent, truncate, short.

Inflorescence a decompound panicle, 10 cm. long, supported at the base by spathaceous bracts; rhachis glabrous, angled; branchlets and pedicels filiform, sinuate, 1-2 cm. long. *Spikelets* 10-20, 3·5 cm. long, 7-9-flowered, distichous, alternate, uppermost empty; rachilla-joints clavate, curved, flattened on the inner surface, pubescent and ciliate, 5-6 mm. long. *Glumes* 2, ovate, scabridly setaceous-acuminate; lemma ovate, 7-9-nerved with transverse nerves, 1·1-3 cm. long, scabridly setaceous-acuminate; palea bifid at the apex, 2-keeled, ciliate on the keels, 7-8 mm. long. *Anthers* 5-6 mm. long, bifid at the apex. *Ovary* ovoid; style short; stigmas 3, long-plumose. *Caryopsis* unknown.

Piri, BALIPARA FRONTIER TRACT, 10,000 ft.

12. SEMIARUNDINARIA Makino.

Spikelets racemosely branched or paniculate; glumes coriaceous, inconspicuously tessellate; stamens 3; style 1; stigmas 3, plumose.

Shrubby bamboos; culm-sheaths appendiculate, deciduous or adherent to a dorsal point only; oral setae smooth, rigid.

***Semiarundinaria pantlingii* Nakai**, in Journ. Arn. Arbor. VI (1925) 151, Syn. *Arundinaria pantlingii* Gamble, Bamb. Brit. Ind. (1896) 129.

An erect shrub. *Culms* tall, smooth, 1·4 cm. in diameter, slightly hairy below the nodes; nodes hairy at the base of the fallen sheath; internodes 17·5-20 cm. long. *Culm-sheaths* rather thick and tough, 25 cm. long, smooth, striate, long-ciliate on the edges, tapering upwards to a convex top; imperfect blade erect, subulate, 7·5-10 cm. long, glabrous on both surfaces, decurrent on the sheath into rounded, hairy auricles furnished with a few long curved bristles; ligule faintly ciliate, dentate, pubescent on the back. *Leaves* oblong-lanceolate, long-acuminate, 12·5-17·5 cm. long, 1·5-2 cm. broad, narrowed at the base into a petiole, ending above in a long, scabrous, twisted point, smooth above, rough beneath,

scabrid on one margin; leaf-sheaths striate, glabrous, long-ciliate on the margins, ending in a very hairy ring furnished on either side with a few long twisted bristles; ligule long, pubescent on the back.

Inflorescence of short panicles terminating the culms and the branches, supported by glabrous sheathing bracts like small culm-sheaths, the spikelets hairy on long wavy, capillary glabrous pedicels. *Spikelets* 5 cm. long or more, curved, very narrow, with 2 empty glumes, 6-10-flowered, the uppermost 2 to 4 lemmas usually barren. *Glumes* 2, lower 5 mm., the upper 10 mm. long, 3-5-nerved, ovate-acuminate, mucronate, slightly ciliate; lemmas rather longer than the upper glume, long-mucronate, 7-nerved, scabrous on the midrib; palea as long or longer than the lemma, 2-keeled, ciliate on the keels, bifid at the apex. *Lodicules* 3, obovate or ovate-acute, faintly nerved and ciliate. *Stamens* 3, filaments short; anthers linear, acute. *Ovary* glabrous; style short; stigmas 3, long-plumose. *Caryopsis* oblong, dark-brown, grooved, surmounted by the persistent base of the style.

Piri, BALIPARA FRONTIER TRACT, 10,000 ft.

13. CHIMONOBAMBUSA Makino.

Spikelets racemose; glumes not tessellate but longitudinally nerved; nerves raised; stamens 3; styles 2; stigmas plumose.

Shrubby bamboos. *Culm-sheaths* almost inappendiculate; oral setae smooth.

Key to the species of *Chimonobambusa*.

Inflorescence on leafy branches.

Culm-nodes without spines. .. 1. *C. polystachya*.

Culm-nodes with spines.

Inflorescence terminal; glumes mucronate. 2. *C. griffithiana*.

Inflorescence axillary, glumes obtuse. .. 3. *C. callosa*.

Inflorescence on separate leafless culms.

Leaves without transverse veinlets. .. 4. *C. khasiana*.

Leaves with transverse veinlets.

Leaf-sheaths ciliate, florets 3-5 fertile. .. 5. *C. intermedia*.

Leaf-sheaths not ciliate, floret 1, usually fertile. .. 6. *C. hookeriana*.

1. **Chimonobambusa polystachya** *Nakai*, in Journ. Arn. Arbor. VI. (1925) 151. Syn. *Arundinaria polystachya* Kurz ex Gamble, Bamb. Brit. Ind. (1896) 7.

A small shrubby bamboo with rather soft culms. *Culm-sheaths* not known. *Leaves* soft, green, 15-20 cm. long, 15-25 mm. broad, long-acuminate, rounded or attenuate at the base into a short petiole, rough above, sparsely hairy below or smooth below, scabrid on one margin; leaf-sheaths greenish yellow, striate, glabrous, ending in a broad bifid callus, produced upwards to meet the ligule; ligule long, striate, blunt, fimbriate.

Inflorescence a terminal or axillary, racemose, leafy panicle, bearing narrow, papery bracts 2.5 cm. long; rhachis channelled on one side. *Spikelets* pedicellate, 1.25-1.8 cm. long, 4-6-flowered, with the uppermost flower imperfect; rachilla claviform, visible, covered with white hairs. *Glumes* 2, ovate-acuminate, 5-7.5 mm. long, 5-7-nerved, keeled and ciliate towards the tip; lemmas ovate, long-acuminate, 10-12.5 mm. long, 7-9-nerved, ciliate on the edges; paleas longer than the lemma, 2-keeled, ciliate on the keels, mucronate, bifid at the apex, 1 nerve intercarinal and 1 nerve extracarinal. *Lodicules* 3, usually 2 ovate, obtuse, fimbriate, with 3 conspicuous areolate veins, the other veins smaller; the third ovate, acute, 3-nerved. *Stamens* exerted often flexuose; anthers long, apiculate. *Ovary* ovoid, glabrous; style short, with two long plumose stigmas.

Common in the KHASI HILLS.

2. **Chimonobambusa griffithiana** *Nakai*, in Journ. Arn. Arbor. VI. (1925) 151. Syn. *Arundinaria griffithiana* Munro, in Trans. Linn. Soc. XXVI (1868) 30.

An erect bamboo covering large areas. *Culms* erect single, 3-10 m. tall, 2.5-3.75 cm. in diameter, olive-green; nodes prominent, armed with a circle of short spines; internodes 17.5-22.5 cm. long, striate, furrowed, furnished with a ring of tawny hairs at the base of the node. *Culm-sheaths* striate, longer than the internodes, 15-22.5 cm. long, 10-12.5 cm. broad at the base, where they bear a belt of thick, tawny, soft hairs, gradually and somewhat convexly attenuate upward to

a truncate top 7 mm. broad; the apex furnished with rounded auricles, back covered thinly with scattered, stiff hairs from bulbous bases, edges ciliate; imperfect blade 5-25 mm. long, triangular, acute, hairy; ligule short, hairy, ciliate; leaves linear-lanceolate, acuminate, thin 10-12·5 cm. long, 10-12·5 mm. wide, narrowed at the base into a short petiole, terminating above in a long, setaceous, somewhat scabrous point, smooth above, pale below, margins smooth; leaf sheaths striate, glabrous, ciliate on the edges, ending in a narrow ring with a few curved bristles; ligule hairy without.

Inflorescence a terminal panicle, surrounded with sheathing bracts, hairy at the base and ciliate on the edges. *Spikelets* 2·5-3·75 cm. long, narrow with 2 empty glumes, 4-6-flowered in verticillate clusters on thin wavy scabrid hairy pedicels; rhachis hairy, flattened on one side; rhachilla long, 5-7·5 mm., flattened, hairy, ciliate at the clavate top. *Glumes* 2, ovate-lanceolate, mucronate, 5-7-nerved, scabrous hairy on the back; lemmas 12·5 mm. long, lanceolate, long mucronate, scabrous, hairy above, 7-nerved; paleas nearly as long, bimucronate, 2-keeled, ciliate on the keels. *Lodicules* 3, obovate, faintly nerved, long ciliate, one shorter and narrower. *Stamens* apparently not exserted; anthers emarginate, crowned with a few fine long hairs. *Ovary* linear-oblong; glabrous, style short; stigmas 2, long, plumose.

A very common bamboo in the NAGA, KHASI and AKA HILLS. It often forms the only underwood in evergreen hill forest.

3. *Chimonobambusa callosa* Nakai, in Journ. Arn. Arbor. VI. (1925) 151. Syn. *Arundinaria callosa* Munro, in Trans. Linn. Soc. XXV (1868) 30.

A shrubby thorny bamboo. *Culms* 4-7 m. tall, 1·25-2·5 cm. in diameter, greyish-green, smooth, striate when young; nodes raised in a ring which is subtended by the base of the fallen sheath fringed with soft brown hairs, and which is studded with thick, short, conical spines, the said spines breaking through the sheath when the latter is detached; internode 15-25 cm. long, nearly solid at the base, the wall higher up being rather thin. *Culm-sheaths* as long as or longer than the internodes, loose, thin, striate, smooth, transversely veined,

ciliate on the edges, gradually attenuate upwards from a hairy base to a 5 mm. truncate apex; imperfect blade 12·5-25 mm. long, subulate, hairy without and within, decurrent on the sheath in long-fringed, short auricles; ligule 2·5 mm. long, fimbriate. *Leaves* 20-22·5 cm. long, 17·5-32·5 mm. wide, oblong-lanceolate, thin; unequally attenuate at the base, shortly petioled, terminating in a scabrous acuminate point, finely glandular-scabrous above, especially on the marginal veins, pale and pubescent beneath, scabrid-serrate on the margins; leaf-sheath densely tawny pubescent, glabrescent, ending in a short ciliate callus, with a few, stiff, curved bristles.

Inflorescence a branched panicle ending in a leafy branchlet; the nodes of the panicle subtended by sheathing papery bracts. *Spikelets* 5-7·5 cm. long, subtended by glabrous, narrow, straw-coloured bracts 6-12-flowered; rhachillae very prominent, 5 mm. long, curved, flattened, glabrous. *Glumes* 2, short, glabrous, ovate-acute, 1-3-nerved; lemmas ovate, acute, mucronate, ciliate at the apex, 3-7-nerved; paleas acute, 2-keeled, thickly pubescent, keels ciliate. *Lodicules* 3, ovate, faintly nerved, fimbriate, one smaller. *Anthers* short blunt. *Ovary* ovate, glabrous; style short; stigmas 2, shortly plumose.

AKA and KHASI HILLS, 5-6,000 ft. Also found on the Saramethi ridge at 7,000 ft.

4. Chimonobambusa khasiana Nakai, in Journ. Arn. Arbor. VI. (1925) 151. Syn. *Arundinaria khasiana* Munro, in Trans. Linn. Soc. XXVI (1868) 30.

A thick bushy shrub. *Culm* 2·5-4 m. tall, 1·25 cm. in diameter, smooth, dark green, almost black; nodes prominent; internodes 15-20 cm. long; branchlets very many from the nodes, geniculate, dark-coloured. *Culm-sheaths* papery, straw-coloured, 15-22·5 cm. long by 3·75-5 cm. broad at the base, striate, smooth, upper part with transverse veinlets, tapering from the middle to a narrow tip; imperfect blade narrower than the apex of the sheath, subulate, recurved, 2·5 cm. long; ligule 5-7·5 mm. long, subulate, dentate or lacerate. *Leaves* linear-lanceolate, 7·5-10 cm. long by 7·5 mm. broad, attenuate at the base into a short petiole, terminating above in a twisted setaceous point, smooth on both sides or sometimes slightly

pubescent beneath, scabrid on both margins; leaf-sheaths thin, striate; ligule rather long.

Inflorescence on separate leafless culms, consisting of falcate, branching, geniculate panicles, fascicled at the nodes, and subtended by membranous, short ovate bracts. *Spikelets* 1-1.25 cm. long, 2-3-flowered; rhachilla produced. *Glumes* 2, short, the lower 3-, the upper 5-7-nerved, shortly mucronate, ciliate at the tip and on the margins; lemmas similar, longer and stiffer, sometimes minutely scabrous-pubescent; paleas longer than the lemmas, 2-keeled, glabrous except the ciliate tip, acute or bifid, 1-nerved on either side of the keels. *Lodicules* 3, ovate-obtuse, or one acute, fimbriate, 3-7-nerved, nerves brown. *Anthers* blunt at the apex. *Ovary* glabrous, elliptic; style short; stigmas plumose.

Quite common in the KHASI HILLS, 5-6,000 ft.

5. *Chimonobambusa intermedia* Nakai, in Journ. Arn. Abor. VI. (1925) 151. Syn. *Arundinaria intermedia* Munro, in Trans. Linn. Soc. XXVI (1868) 28.

A slender caespitose bamboo. *Culms* smooth, greyish-green, 3-4 m. tall; nodes swollen with a prominent ring and a whitish line below them; internodes 12.5-25 cm. long; branches many from the nodes. *Culm-sheaths* glabrous, papery, strongly striate, 20-25 cm. long, by 2.5-5 cm. broad, ciliate below the blade; imperfect blade narrow, subulate, up to 5 cm. long, recurved; ligule up to 5 mm. long, blunt. *Leaves* bright green, very variable, 7.5-20 cm. long, attenuate at the base into a short swollen petiole, terminating in a setaceous point, scabrous above and on both margins, pale and smooth or hairy near the mid-rib beneath; leaf-sheaths striate, glabrous or with scattered, long, stiff hairs above; callus minute; auricle falcate with curving, deciduous bristles; ligule elongate, obtuse or triangular.

Inflorescence on leafless stems consisting of racemose panicles verticillate from the nodes, subtended by membranous bracts; rhachis smooth, dark, with small triangular bracts below and sometimes a tuft of hair above at the axils. *Spikelets* 1.25-2.5 cm. long, yellow or purplish, 3-5-flowered, rhachilla produced and crowned by an imperfect floret or

naked; rhachilla clavate, compressed, long ciliate above. *Glumes* 2, pale, ovate, membranous, the lower 3-5-, the upper 7-9-nerved, blunt or acute, ciliate at the tip; lemma similar but shortly mucronate, 7-9-nerved, often minutely scabrous on the dorsal surface; palea longer than the lemma, bi-mucronate, 2-keeled, ciliate on the keels. *Lodicules* 3, ovate, fimbriate. *Stamens* slightly exerted; anthers blunt or slightly apiculate. *Ovary* linear-oblong, glabrous; style short; stigmas 2, plumose; caryopsis short, oblong, swollen in the middle, tipped with the persistent base of the style.

Piri, BALIPARA FRONTIER TRACT. 10,000 ft.

6. *Chimonobambusa hookeriana* Nakai. in Journ. Arn. Abor. VI. (1925) 151. Syn. *Arundinaria hookeriana* Munro, in Trans Linn. Soc. XXVI (1868) 29.

A caespitose bamboo. *Culms* 5-6 m. tall, glaucous-green in colour, covered with a white scurf when young, often striated green and yellow: nodes with dark bluish rings below, prominently ringed with the persistent base of the sheath; internodes 20 cm. long, fistular; walls thin. *Culm-sheaths* papery striate, 30-60 cm. long, 7.5-15 cm. broad at the base, attenuate to a truncate summit; imperfect blade linear, 7.5-15 cm. long, 2.5-3.5 mm. broad; ligule short. *Leaves* linear-to-oblong-lanceolate, glaucous-green when young, 15-30 cm. long, attenuate at the base into a short petiole, ending above in a scabrous setaceous point, somewhat rough above, pale and glabrous beneath, margins scabrous; leaf-sheaths striate, glabrous but minutely ciliate at the margins, ending in a broad callus and thin membrane without bristles; ligule long, conspicuous.

Inflorescence of loose, falcate, racemose panicles fascicled at the nodes of a leafless culm. *Spikelets* about 8 mm. long, pedicellate, 1-flowered with a terminal imperfect floret. *Glumes* 2, oblong, thin, membranous, the lower 2.5, the upper 5 mm. long; the lower 3-nerved hairy at the tip, the upper 5-nerved, mucronate; lemma large, hard, broadly ovate, involute, angled, prominently 3-nerved; palea thick, 2-keeled, glabrous, hirsute on the prolonged tip. *Lodicules* 3, thickened at the base and coloured, obovate, acute or rounded, fimbriate, 3-5-

nerved. *Stamens* exserted, anthers subacute. *Ovary* ellipsoid, glabrous; style short; stigmas 2, short, plumose. *Grain* ellipsoid, dark, smooth, tipped with the pointed base of the style.

Piri, BALIPARA FRONTIER TRACT, 6-8,000 ft.

14. SINOBAMBUSA Makino.

Spikelets racemose, sub-phyllipodous; glumes tessellate, acute; stamens 3; styles 2; stigmas plumose.

Shrubby bamboos. *Culm-sheaths* deciduous, appendiculate; internodes extremely long; oral setae smooth, rigid.

Sinobambusa elegans Nakai, in Journ. Arn. Arbor. VI (1925) 152. Syn. *Arundinaria elegans* Kurz, in Jour. As. Soc. Beng, XLII (1873) 248.

An evergreen, slender, tufted, shrubby bamboo. *Culms* green or blackish, 4-7 m. tall, flattened on one side in alternate internodes; nodes somewhat raised; internodes 17-23 cm. long. *Culm-sheaths* one-third the length of the internodes, papery, striate, minutely hispid above, narrowed in the upper third to a truncate mouth bearing minute auricles; imperfect blade narrow, subulate, recurved; ligule rather broad, finely ciliate. *Leaves* linear-lanceolate, long-acuminate, 10-12.5 cm. long, 7.5-12.5 mm. wide, shortly petioled, smooth above, glaucescent beneath, cartilaginous and scabrid on the margins, tessellately nerved; sheaths striate, smooth, ending in a minutely ciliate callus; ligule very short.

Inflorescence a terminal interrupted leafy panicle or raceme, bearing pedicellate spikelets; rhachis thin, wiry, curving, pubescent. *Spikelets* 2.5 cm. or more long, flattened, 7-8-flowered; rhachilla visible, wiry, clavate. *Glumes* 2, 5 mm. long, 3-5-nerved, ovate-acuminate, keeled, ciliate on the keel; lemmas similar, 7-nerved, with transverse veins; palea shorter, 2-keeled, white-ciliate on the keels, obovate, bifid at the apex, 2-nerved between the keels, 1-nerved on either side. *Lodicules* 3, 3-5-nerved, ovate, acute, long-ciliate. *Stamens* hardly exserted; anthers purple, rounded or mucronate at the tip. *Ovary* smooth, oblong, surmounted by the short style; stigmas 2, white plumose.

A common bamboo on the slopes of Pulebadze, Kohima, NAGA HILLS, where it is much sought after as the shoots are made into a pickle.

15. THAMNOCALAMUS Falconer.

Spikelets 1-8-flowered, with upper florets more or less incomplete, arranged in simple leafy racemes, the leaves forming sheaths or bracts. *Glumes* indistinctly nerved, about a third shorter than the spikelets; lemma acute or long-acuminate, equalling or exceeding the palea in length; lodicules 3, rarely 6. *Style* short; stigmas 3.

Caespitose bamboos. *Culms* fistular, cylindrical, arching; culm-sheaths rapidly caducous. *Inflorescence* with sheathing bracts at the base.

Key to the species of *Thamnocalamus*.

Erect shrubs.

Transverse veinlets conspicuous; bracts large.

Bracts narrow, enclosing 2-3 spikelets. .. 1. *T. spathiflorus*.

Bracts broad, enclosing 3-5 spikelets. .. 2. *T. aristatus*.

Transverse veinlets inconspicuous; bracts short. .. 3. *T. falconeri*.

Scandent shrub. .. 4. *T. prainii*.

1. *Thamnocalamus spathiflorus* Munro, in Trans. Linn. Soc. XXVI (1868) 34. Syn. *Arundinaria spathiflora* Trin. in Mem. Acad. Petersb. Ser. 6. III (1835) 617.

A gregarious, caespitose, shrubby bamboo. *Culms* up to 6 m. tall, smooth, fistular; internodes 15-36 cm. long; branches 30-45 cm. long, woody, glabrous; branchlets semi-verticillate, fasciculate, shining; nodes hardly prominent, marked by a white ring. *Culm-sheaths* straw-coloured, coriaceous, thin, loose, smooth inside, striate without, with ciliate margins; margins parallel to near the top where they are slightly narrowed convexly into a truncate, rounded mouth; imperfect blade 5-10 cm. long, erect, subulate, decurrent on the sheath, caducous; ligule short, fimbriate. *Leaves* clustered in groups of 2-4 at the ends of short, jointed branches which bear loose, narrow, yellow sheaths, 7.5-12.5 cm. long, linear-lanceolate, attenuate at the base into a short petiole, terminating above in an acute hairy point, smooth on

both surfaces, scabrous on the margins; leaf-sheaths loose, 5-7·5 cm. long, straw-coloured, striate, ciliate on one margin, truncate at the top into a narrow, ciliate callus and bearing short auricles with a few long purple bristles; ligule long ciliate.

Inflorescence usually on separate leafless culms, sometimes leafy; rhachis very slender, much jointed, bearing at the joints papery straw-coloured, narrow sheaths 3·75-7·5 cm. long, truncate or with an imperfect blade, which enclose 2-3 pedicellate (or one sessile) spikelets. *Spikelets* loose, compressed, 2·5-6·25 cm. long, with 2 glumes and 4-8 hermaphrodite florets; rhachilla long-clavate, white-hairy at the tip. Glumes 2, linear-lanceolate; one obtuse, short, the other long, mucronate, striate, glabrous; lemmas ovate, long-acuminate, mucronate, 1·5-2·5 cm. long, scabrous, striate; palea much shorter, 2-keeled, ciliate on the keels, sometimes bifid, 1-2-nerved. *Lodicules* 3, ovate-falcate or ovate-acute, 3-5-nerved, fimbriate. *Stamens* long-exserted; anthers blunt. *Ovary* glabrous, ovoid, elongate; style short; stigmas 3, long plumose. *Caryopsis* linear-oblong, glabrous, furrowed.

Probably occurs on Piri, BALIPARA FRONTIER TRACT. 10,000 ft., as it is common in BHUTAN.

2. *Thamnocalamus aristatus* E. G. Camus. *Bambusées* (1913) 54. *Syn. Arundinaria aristata* Gamble, *Bamb. Brit. Ind.* (1896) 18, t. 17.

A tufted bamboo with robust culms. *Culms* at first mealy white, then glaucous green, afterwards a brilliant yellow, 2·5-4 m. high, 12-15 mm. in diameter; nodes hardly inflated; internodes 20-30 cm. long. *Culm-sheaths* 15-20 cm. long, 7-7·5 cm. broad at the base, gradually attenuate towards the truncate summit; ligule short, pubescent; imperfect blade linear, scarcely subulate, decurrent, 24-48 mm. long. *Leaves* grouped in twos and threes at the top of the branchlets, oblong-lanceolate, attenuate at the base into a long, glandular, 4·5 mm. long petiole, terminating above in a setaceous point, glabrous or sparsely hairy below, scabrid on one margin; median nerve narrow shining; lateral nerves 3-5 pairs, tessellate; leaf-sheaths lax-striate, 5-7·5 cm.

long, terminating in a callus clothed with long hairs; ligule long, acute or truncate.

Inflorescence composed of long racemes grouped in panicles at the top of the culms, the articulations of the branchlets with large spathe-like bracts, which enclose 3-5 shortly pedicelled spikelets. *Bracts* 36-50 mm. long, 12-15 mm. broad, carrying a foliaceous, more or less developed, limb. *Spikelets* 25-50 mm. long, 4-8-flowered, terminal floret barren; rhachilla visible, articulate, whitish, hairy below the nodes. *Glumes* similar, membranous, oblong-lanceolate, scaberulous at the top, keeled, mucronate, 3-5-7-nerved. *Lemma* ovate, long acuminate, dark coloured, scabrous-hirsute, with 9 prominent nerves; palea somewhat shorter, 2-keeled, 2-cuspidate at the top, with ciliate keels, scabrous, nerved within and without the keels. *Lodicules* lanceolate-acute, ciliate, 3-nerved. *Stamens* purple, obtuse at the apex. *Ovary* ovate, short-styled with 3 hairy stigmas. *Grain* linear-oblong, dark brown in colour, furrowed on one side.

On Piri, BALIPARA FRONTIER TRACT, 10,000 ft.

3. *Thamnocalamus falconeri* Hook, f. apud Munro, in Trans. Linn. Soc. XXVI (1868) 34. Syn. Arundinaria falconeri Benth. et Hook. f., Gen. Pl. III, 1208.

A laxly caespitose bamboo. *Culms* fistular, smooth when young, covered with a white scurf when old, frequently striped yellow and green; nodes raised; internodes 10-15 cm. long; branchlets almost filiform, rigid, fascicled at the nodes. Culm-sheaths striate, hairy when young, straw-coloured, papyraceous, 20-30 cm. long, 50-75 mm. broad, ciliate on the margins, attenuate and truncate at the top; imperfect blade subulate, recurved, 7.5-12 cm. long, 5-7 mm. broad; ligule narrow, hairy. *Leaves* 7.5-10 cm. long, 7-14 mm. broad, narrow, thin, pale, attenuate at the base into a somewhat long petiole furrowed above, ending above in an acuminate or subsetaceous point, scabrid on the margins; sheaths glabrous, truncate above, not fimbriate; ligule elongate, hairy.

Inflorescence a panicle with racemosely arranged branchlets, with one or more racemes of spikelets 2.5 cm. long,

supported at the base by spathiform and chaffy bracts. *Spikelets* 5-7 in each raceme, glabrous, 7-9 mm. long, shortly pedicelled, 1-flowered or rarely 2-flowered; rhachilla produced and carries a sterile floret. *Glumes* 2, membranous, oblong, acute or mucronate, 3-5-nerved; lemma ovate-lanceolate, 5-7-nerved, shortly mucronate, ciliate at the tip; palea as long or longer, 2-keeled, furrowed on the back, bifid at the top. *Lodicules* almost equal, fimbriate. *Stamens* exserted, obtuse or shortly apiculate, purple. *Ovary* ovate, glabrous; style short; stigmas 3. *Grain* linear, oblong, furrowed.

Piri, BALIPARA FRONTIER TRACT. 10,000 ft.

4. *Thamnocalamus prainii* E. G. Gamus, *Bambusées* (1913) 54. Syn. *Arundinaria prainii* Gamble, *Bamb. Brit. Ind.* (1896) 21.

A small, wiry, climbing shrub. *Culms* thin, slender, smooth, yellowish, curving, up to 10 m. long, 5-7.5 mm. in diameter; nodes swollen in a well-marked ring; internodes short, usually 20-22.5 cm. long, wall thick, often quite solid; branches fasciculate at the nodes. *Culm-sheaths* thin, somewhat scabrous above, 2-15 cm. long; 10-20 mm. broad, attenuate convexly in the upper half to a narrow edge; imperfect blade short, 2.5-5 mm. long, subulate; ligule short, rounded. *Leaves* thin, oblong-lanceolate, 5-10 cm. long, 7.5-17.5 mm. wide, round at the base into a short petiole, terminating above in a long, curved, setaceous point, scabrid on one margin; leaf-sheath striate, smooth; ligule long, rounded, blunt.

Inflorescence in terminal or axillary panicles, bearing distant spikelets in the axils of sheath-like straw-coloured bracts; rhachis very slender, wiry, smooth, geniculate. *Spikelets* 2.5-3.5 cm. long, on slender pedicels, 3-6-flowered. uppermost flower imperfect, distichously arranged on the alternate sides of a wiry flexuose rhachis. *Glumes* usually 2 (or 3), the lower keeled, ciliate on the margins, lanceolate, the upper ovate-acute, 3-5-nerved, ciliate at the tip; lemmas triangular, falcate, acute, glabrous, 9-11-nerved; paleas falcate, as long as the lemmas, 2-keeled, minutely ciliate on the keels, acute or bifid at the apex. *Lodicules* 3, two broadly

ovate, 3-nerved, ciliate, the third lanceolate-acute, 1-3-nerved. *Stamens* 6; anthers purple, bluntly apiculate. *Ovary* oblong, hairy above; style thick, bulbous at the base; stigmas 3, plumose.

On Pulebadze, Kohima, NAGA HILLS, 6,000 ft.; also in the JAINTIA HILLS about 3,500 ft.

16. PHYLLOSTACHYS Sieb. et Zucc.

Spikelets sessile, 1-4-flowered; rhachilla articulate between the florets; glumes 1-2, many-nerved, often unequal, glabrous, often ending in an imperfect limb; lemmas ovate-lanceolate, acuminate, many-nerved; paleas 2-keeled, often bi-mucronate, many-nerved; lodicules often 3, unequal, lanceolate-acute, nerved. *Stamens* 3, long exserted; anthers linear. *Ovary* stipitate, ovoid or globose, glabrous; style long; stigmas 3, long, plumose.

Shrubby or arborescent bamboos, caespitose. *Culms* smooth, rough or pubescent, flattened on one side in alternate nodes; nodes prominent; internodes rather short; branches 2-3-nate at the nodes; culm-sheaths papyraceous, striate, tessellate, rounded, ending in a subulate imperfect limb. *Leaves* small or medium-sized, petioled, articulate on the sheath; sheaths loose, smooth.

Inflorescence a terminal panicle, rather lax, covered with spathiform, imbricate bracts, which often end in an imperfect limb.

Key to the species of *Phyllostachys*.

Leaves thin, leaf-sheaths long, bristly at the mouth.	..	..	..	1. <i>P. assamica</i> .
Leaves thick, leaf-sheaths with hardly any bristles at the mouth.	..	..	..	2. <i>P. mannii</i> .

1. *Phyllostachys assamica* Gamble ex Brandis, Ind. Trees (1906) 667.

A caespitose bamboo. *Culms* 10-12 m. tall, brilliant green in colour, up to 20 cm. in diameter, sometimes more, with a waxy ring below the nodes which disappears with age; nodes glabrous and internodes short. *Culm-sheaths* 15-25 cm. long, thin, contracted at the summit into a short, truncate

or rounded collar, covered with black hairs, which are at first appressed, afterwards erect and caducous; imperfect limb subulate, papyraceous, at first erect then turned backwards and downwards; striations dark green in the centre, pink on the margins; auricles small if present, often absent. *Leaves* broadly linear, glaucous, shortly petioled, somewhat long acuminate-setaceous at the tip, 8-12 cm. long, 12-16 mm. broad, toothed on the margins, covered on the lower surface with stiff white hairs; sheaths keeled, ciliate on the margins, shortly auricled, throat with a few hairs.

Inflorescence a panicle made up of spikes of lanceolate spikelets; bracts ciliate at the throat, with a foliaceous limb, large, ovate-lanceolate, 35 mm. long, by 20 mm. broad. *Spikelets* brownish or greenish, 20-25 mm. long, with 3-5 perfect florets, the upper floret imperfect. *Lower glume* very large, rather like a sheath, often terminated by a very small limb; upper glume short, oblique, obliquely acute, few-nerved, 2-keeled, those of the upper spikelets longer and with more unequal sides, often absent in the uppermost spikelet; lemmas ovate-acute, many-nerved; nerves strong; paleas as long as the lemmas, narrow, bi-mucronate at the top, 2-keeled, ciliate on the keels. *Lodicules* ovate-lanceolate or oblanceolate, sometimes emarginate or bifid, fimbriate, 3-7-nerved unequal. *Stamens* exserted, pendulous; connective apiculate. *Ovary* ovoid, furrowed at the base.

MISHMI HILLS, collected by Griffith near Premsong's village.

2. *Phyllostachys mannii* Gamble, Bamb. Brit. Ind. (1896) 28.

A caespitose shrub. *Culms* 5-6 m. tall, 2.5-3 cm. in diameter; internodes 20 cm. long, yellow, flattened on one side. *Culm-sheaths* papery, straw-coloured, 20-22.5 cm. long, 2.5-5 cm. broad, rounded at the top and truncate, extended at the base of the blade into two short, fimbriate, caducous, curved auricles; imperfect blade 5.7-5 cm. long, recurved, narrow, subulate, decurrent on the sheath; ligule broad, long-pectinate. *Leaves* thick, 10-12.5 cm. long, 1.25-2 cm. wide, rounded at the base into a petiole 7.5 mm. long, shortly acuminate at the tip, smooth and glabrous on both surfaces

except for a few-white hairs near the midrib below, spinulose-serrate on one edge; transverse nerves extremely numerous; leaf sheaths loose, glabrous, smooth, straw coloured, ending in a narrow ciliate callus with a few deciduous bristles.

Inflorescence unknown.

This bamboo is commonly cultivated in Shillong, KHASI HILLS, 5,000 ft.

2. CENTOTHECEÆ.

Perennial grasses with broadly lanceolate leaf blades, tessellately nerved.

Inflorescence a dense, loose or simple panicle; spikelets laterally compressed or almost terete, either pedicelled or sessile. *Spikelets* 1- to several-flowered, in the case of the former the fertile floret being succeeded by several empty lemmas; in the latter, the florets being all hermaphrodite or the uppermost reduced; rhachilla disarticulating either above or below the glumes. *Lower glume* smaller than the upper, membranous; lemmas similar in texture, mucronate, glabrous or bearing tubercle-based reflexed bristles, shortly awned or mucronate. *Lodicules* 2. *Stamens* 2-3.

Key to the genera of *Centotheceæ*.

Spikelets 2- to several-flowered.	..	..	1. <i>Centotheca</i> .
Spikelets with 1 fertile floret.	..	..	2. <i>Lophatherum</i> .

1. CENTOTHECA Desv.

Spikelets laterally compressed, linear, oblong or obovate-oblong, awnless, pedicelled on the slender branches of loose or contracted panicles; rhachilla very slowly disarticulating above the glumes and between the florets. Florets two to many, (hermaphrodite or the uppermost reduced, very rarely the lowest reduced to its lemma), exserted from the glumes. *Glumes* persistent, slightly unequal, acute or obtuse, keeled, membranous, 3-5-nerved. *Lemmas* lanceolate to ovate or oblong in profile, acute or obtuse, usually mucronulate, keeled, herbaceous, firmly membranous or chartaceous, 7-9-nerved, all smooth, or the lower one or two smooth and the upper bearing short, rigid, spiny, tubercle-based bristles near the margins. *Palea* as long as or slightly shorter than the lemmas, 2-keeled. *Lodicules* 2. *Stamens* 2-3. *Ovary* glabrous. *Caryopsis* ovoid-oblong, free

between lemma and palea; scutellum small; hilum sub-basal.

Perennial grasses with broad, flat leaf-blades and terminal panicles.

A genus of three species in tropical Africa. Madagascar, Asia, Polynesia and N.E. Australia.

***Centotheca lappacea* Desv.** in Nouv. Bull. Soc. Phil. II (1810), 189.

A loosely tufted perennial. *Culms* mostly geniculately ascending, rarely erect, 15—120 cm. high, slender to stout, simple or branched, 5- to many-noded, glabrous and smooth. *Leaves* glabrous, rarely hairy; sheaths prominently striate; ligules truncate, up to 2 mm. long, lacerate; blade lanceolate, ovate-lanceolate or narrowly elliptic, contracted or tapering at the base, acute or acuminate, 6-25 cm. long, 8-32 mm. wide, flat, rough on the margins, finely nerved with prominent transverse veinlets.

Panicle loose, 7.5-25 cm. long and up to 20 cm. wide, green; rhachis glabrous or hairy at the nodes, minutely scaberulous upwards; branches numerous, very slender, spreading, at length becoming deflexed and disarticulating from the rhachis, loosely divided below and simple upwards, up to 15 cm. long; pedicels capillary, very unequal, scaberulous or minutely pubescent. *Spikelets* oblong or ovate-oblong, 4-7 mm. long, loosely 2-4-flowered; rhachilla produced and bearing a rudimentary floret. *Glumes* narrowly-lanceolate to lanceolate-oblong in profile, acute, sometimes mucronate, 3-4 mm. long, keeled, 3-5-nerved, persistent. *Lemmas* oblong-acute or ovate-obtuse, apiculate, rounded dorsally, 5-7-nerved, those of the upper florets furnished with reflexed, rigid, short, tubercle-based bristles near the margins; paleas shorter, narrow, often decurrent on the rhachilla; lodicules absent. *Stamens* 2-3; anthers short, linear. *Ovary* surmounted by two short styles; stigmas short, hairy. *Caryopsis* ovoid-acute, rounded, free but enclosed between lemma and palea.

A common forest grass in plains and hills up to 4,000 ft.

2. LOPHATHERUM Brongn.

Spikelets laterally compressed or almost terete, lanceolate, solitary, subsessile, falling entire at maturity, secund on the slender, simple branches of a lax panicle; rhachilla continuous. *Fertile floret* with several sterile (up to 9) florets above it on a long rhachilla joint, the sterile florets being closely imbricate and reduced to their lemmas. *Glumes* slightly unequal, elliptic-oblong, obtuse, herbaceous, 5-7-nerved, the lower smaller. *Fertile lemmas* longer than the glumes, ovate-oblong, mucronate or shortly awned from the tip, with the awn retrosely scabrid, herbaceous; palea linear, as long as the lemma, thinly membranous, 2-keeled, with the keels very narrowly winged. *Lodicules* 2. *Stamens* 2-3. *Caryopsis* narrowly oblong, free between the lemma and palea; scutellum small; hilum elongated. *Sterile lemmas* much smaller and narrower than the fertile but similar in texture.

Perennial grasses with broad, flat leaf blades, sterile lemmas projecting as a tuft of short rigid awns from the top of the spikelet.

A small genus of forest grasses with 2 species in Tropical Asia and N. E. Australia.

Lophatherum gracile Brongn. in Dup. Voy. Bot. (1829) 50.

A loosely tufted perennial with fleshy roots. *Culms* erect or ascending from a geniculate base, slender to somewhat stout, 30-150 cm. tall, simple, glabrous and smooth. *Leaf-sheaths* loose, compressed and keeled, prominently striate, loosely hairy or glabrous; ligules very obscure, truncate, up to .5 mm. long, ciliolate; blades lanceolate to ovate, acute or acuminate, gradually or abruptly narrowed into a slender petiole-like base, up to 12 mm. long, flat, 10-25 cm. long, 12-32 mm. wide, thin, loosely hairy or glabrous, with fine longitudinal nerves and numerous transverse veinlets.

Panicle contracted or open, lax, 15-50 cm. long, composed of a few distant or clustered branches; rachis slender, scaberulous; branches triquetrous, scaberulous, at length

spreading; pedicels reduced to minute stumps; spikelets acute, 6-12 mm. long, green. *Lower glume* 2·5-4 mm. long, 5-nerved, green with hyaline margins, minutely hairy at the base and shortly pilose on the margins. *Upper glume* similar to the lower but 5-7-nerved, glabrous, 3·5-5·5 mm. long. Fertile floret; lemma obtuse or minutely emarginate, 5·6·5 mm. long, 7-9-nerved, similar in texture to the glumes, glabrous with a straight rigid awn up to 2 mm. long; palea glabrous; 2-keeled, keels slightly winged. *Stamens* 3; lodicules absent. *Styles* connate at the base; stigmas long. *Caryopsis* oblong in shape, free. *Sterile* florets densely imbricate, each represented by an empty lemma terminating in a short, retrorsely-scabrid, short or recurved awn.

A forest grass common in the plains and hills up to 4,000 ft.

3. FESTUCEÆ.

Annual or perennial herbs; leaf-blades very narrow to lanceolate or rarely ovate, spikelets usually all alike, hermaphrodite rarely unisexual, 2 to many-(rarely 1-)-flowered, laterally compressed, arranged in loose, contracted or spike-like panicles, rarely in spikes or racemes; rhachilla usually disarticulating above the glumes and between the florets, rarely below the glumes and the spikelets then falling entire; glumes persistent, similar, or the lower smaller, usually shorter than the lowest lemma; lemmas membranous to coriaceous, often herbaceous-membranous, usually 5 to many-(very rarely 3-) nerved, awnless or awned from the entire or 2-lobed tip, or just below the tip, rarely several-awned, the awn straight or curved, not geniculate; lodicules 2, rarely 3 or 0; stamens 3, rarely 2 or 1; caryopsis usually tightly enclosed between the lemma and palea.

Key to the genera of *Festuceæ*.

Inflorescence a simple terminal spike or raceme.

Spikelets terete, racemes nodding. .. 1. *Brachypodium*.

Spikelets laterally compressed, spike erect. .. 2. *Lolium*.

Inflorescence a panicle.

All spikelets alike and fertile.

Glumes and lemmas muticous.

Panicles expanded; glumes and lemmas sub-equal .. 3. *Poa*.

Panicles narrow: glumes much shorter than the strongly nerved lemmas. .. 4. *Glyceria*.

Glumes and lemmas caudate, aristate or awned.

Spikelets in dense clusters. .. 5. *Dactylis*.

Spikelets not in clusters.

Lower glume much shorter than the upper. .. 6. *Vulpia*.

Lower and upper glume sub-equal.

Top of the ovary hairy-appendaged, lemmas keeled. .. 7. *Bromus*.

Top of the ovary without an appendage, lemmas only keeled above. .. 8. *Festuca*.

Spikelets of two kinds, sterile and fertile. .. 9. *Cynosurus*.

1. BRACHYPODIUM Beauv.

Spikelets at first cylindric, then laterally compressed in simple racemes or false spikes with very short pedicels, with the flattened side to the axis; rhachilla glabrous, disarticulating above the glumes and between the florets. *Florets* 5 to many, hermaphrodite; the uppermost more or less reduced. *Glumes* more or less unequal, firm, strongly 3-7-nerved; lower often slightly asymmetric. *Lemmas* oblong to oblong-lanceolate usually narrowed into a straight awn, or mucronate, rounded on the back, closely imbricate at first, then more or less diverging and rolling inwards, 7-nerved, nerves prominent in the upper part faint below; callus very short, obtuse. *Palea* oblong, rather broad, very obtuse or truncate, slightly shorter than the lemma, 2-keeled; keels rigidly ciliate. *Lodicules* 2, lanceolate, usually ciliate. *Stamens* 3, rarely 2. *Ovary* with a villous appendage at the top; styles laterally inserted on the appendage, very short; stigmas plumose, laterally exerted. Caryopsis linear or linear-oblong, convex-concave, adhering more or less to the palea; embryo small; hilum filiform, long.

Annual or perennial grasses with flat or setaceous convolute leaves. Inflorescence a terminal, simple, spiciform raceme: joints of axis more or less hollowed, at least the lower, opposite the spikelets.

Brachypodium sylvaticum. Beauv. Agrost. (1810)
101.

Culms up to 150 cm. high, smooth and glabrous, woolly or quiet glabrous at the nodes. *Leaves* 8-18 cm. long, up to 1 cm. broad, more or less villous and scaberulous, linear, flat, or flaccid or convolute, tapering to a fine point. *Sheaths* striate, more or less villous, often quite glabrous, hairy on the margins. Ligule prominent, blunt, fringed at the top.

Inflorescence a simple raceme of a few to numerous, shortly pedicelled or subsessile spikelets, which are cylindrical at first, later on becoming compressed. *Racemes* up to 15 cm. long, nodding. *Glumes* two, usually unequal in size, the upper being the larger. *Lower glume* lanceolate, 3-5 mm.

long, and 1 mm. broad at the base, 5-nerved, tapering to a blunt tip. *Upper glume* 5 mm. long by 1.5 mm. broad, 7-nerved. *Florets* about 9. *Lowest lemma*, 8 mm. long by 2 mm. broad, broadly lanceolate, 7-nerved, awned from the entire tip, the scabrid awn being up to 8 mm. long; callus naked. The remaining lemmas diminish in size upwards and the last 1 or 2 are rudimentary, consisting merely of reduced lemma and awn, with or without a rudimentary palea. *Stamens* 3. *Ovary* with hairs on the top about the styles, this feature is not however apparent in young specimens. *Lodicules* 2, ciliolate.

KHASI HILLS and NAGA HILLS, BALIPARA FRONTIER TRACT, 6-10,000 ft.

Var. khasianum Hook. f. Distinguished from the type by the very long awns which may reach 3 cm. and by the hairy callus.

KHASI HILLS, 6,000 ft.

Var. wattii Hook. f. Rather stouter and more robust. The lower spikelets are pedicelled, the pedicel of the lowest spikelet is half as long as the spikelet or less, pubescent; awn about as long as the lemma.

NAGA HILLS. Japvo, 9,000 ft.

2. *LOLIUM* Linn.

Spikelets usually more or less compressed, 2-ranked, alternate, sessile in the hollows of the rhachis of a simple spike; rhachilla glabrous, disarticulating above the glumes and between the lemmas. *Spikelets* 3-11- or even more-flowered, hermaphrodite or the uppermost reduced. *Glumes* of terminal spikelets, equal and similar, lower suppressed on the lateral spikelets; upper linear to oblong, obtuse to acute, flat or slightly rounded, coriaceous, prominently 7-9-nerved. *Lemmas* oblong, rounded on the back, sub-obtuse, minutely 2-toothed (or acute in profile) more or less chartaceous except at the short hyaline tips, glabrous, 5-nerved, muticous or awned; awn a straight bristle from close to the tip. *Paleas* equalling the lemmas or nearly so, 2-keeled, keels more or less crested. *Stamens* 3. *Lodicules* 2, lanceolate with a lateral tooth. *Ovary* glabrous, truncate; style distinct, very short; stigmas laterally exserted, plumose. *Grain* elliptic-oblong to linear-oblong, tightly

enclosed by the lemma and palea, adhering to both; embryo short; hilum linear, almost as long as the grain.

Key to the species of *Lolium*.

Glume shorter than the spikelets; perennials.

Lemmas nearly or quite awnless. .. 1. *L. perenne*.

Lemmas, at least the upper, awned. .. 3. *L. temulentum*.

Glume as long as or longer than the spikelets:

annual. 2. *L. multiflorum*.

1. *Lolium perenne* Linn. Sp. Pl. (1753) 83.

A short-lived perennial grass with tufted stems; culms erect or decumbent at the base, 30-60 cm. tall; roots fibrous; leaves flat or convolute, slightly auricled at the base, dark green in colour, smooth and glossy on the undersurface, dull with distinct nerves above; blades linear to linear-lanceolate, up to 7 cm. long, 2-4 mm. wide; ligule short, membranous, truncate; sheaths close fitting when young, slipping from the culm when old, not keeled.

Inflorescence spicate; spikes terminal, simple, solitary; rhachis alternately and distichously hollowed out to contain the spikelets, smooth and glabrous. *Spikelets* solitary, 2-ranked, usually more or less compressed, the lowest lemma appressed to the rhachis, 3-11-or more-flowered. *Glumes* 2 in the terminal spikelet, the lower being suppressed in the other spikelets. *Lower glume* linear to oblong-lanceolate, obtuse, 5- or more-ribbed on the outside, thick, opaque, shorter than the spikelet. *Upper glume* (of all spikelets) similar in shape and texture, many ribbed or nerved, 7 mm. long. *Lemmas* chartaceous, oblong, shorter than the glumes, obtuse, acute or awned, 6 mm. long, rounded on the back 5-7-to more-nerved; paleas equal in length to the lemmas, truncate, 2-keeled; keels sometimes narrowly winged, minutely scabrid, margins infolded. *Florets* hermaphrodite or the uppermost imperfect. *Lodicules* 2. *Stamens* 3, 2.5 mm. long. *Styles* 2. *Stigmas* plumose. Grain elliptic to linear-oblong, tightly enclosed by and adhering to the lemma and palea.

A good fodder grass introduced into Shillong some years ago, where it has spread considerably.

2. *Lolium temulentum* Linn. Sp. Pl. (1753) 83.

An annual grass; culms fascicled or solitary, erect, rather stout, straight, 30-45 cm. tall, glabrous, rough, at least in the upper part, 2-4-noded; uppermost internode usually long exserted; leaves glabrous; sheaths rather tight, strongly striate; ligules very short, truncate; blades linear, acute, 15-30 cm. long, 5-7 mm. broad, rough all over or only on the upper surface and along the margins.

Spikes erect, 8-30 cm. long, with 10-20 spikelets; axis rather stout, slightly rough or smooth on the back; spikelets about the length of the internodes or the lower shorter and more distant, the upper more approximate, laterally compressed, 12-20 mm. long, 5-9-flowered; florets turgid; upper glume oblong, equalling or somewhat exceeding the uppermost floret, sub-obtuse to acute, very rigid, flat, glabrous and smooth, 7-9-nerved; lemmas elliptic-oblong, obtuse or sub-obtuse, muticous or usually awned, 7-8 mm. long, rounded on the back, herbaceous-chartaceous, smooth, 5-nerved, tip rather broad hyaline, obscurely 2-toothed; awn sub-terminal, straight, rather stout at the base, scaberulous, up to 20 mm. long; palea broad, keels green, stout; anthers over 2.5 mm. long; grain elliptic-oblong, semiterete, grooved in front, slightly shorter than the palea.

Introduced into Shillong in 1934.

3. *Lolium multiflorum* Lam. Flor. Franc. III (1878) 621.

An annual; culms fascicled, geniculate, ascending or erect, 20-45 cm. tall, glabrous, smooth or slightly rough in the upper part, 4-5-noded, internodes at length more or less exserted, simple or branched below; leaves glabrous; sheaths striate, smooth, lower sometimes purplish; ligule very short, truncate from an auricled base; blades linear, long tapering to a very slender point, 10-20 cm. long by 2.5-5 mm. broad, flat, somewhat rigid, scabrid on the upper surface and along the margins.

Spikes erect, 15-30 cm. long, made up of 12-30 spikelets; axis rather slender, smooth, scabrid on the margins; internodes (except the lowest) distinctly shorter than the

spikelets; spikelets laterally strongly compressed, elliptic-oblong, 15-20 mm. long, obliquely erect, 9-11-flowered, uppermost floret long exserted from the glume. *Upper glume* narrow, oblong, sub-obtuse, somewhat rounded on the back, equalling the contiguous floret or nearly so, strongly 7-nerved; lemmas awned or muticous, oblong 6-7.5 mm. long, sub-herbaceous-chartaceous, light green or ringed with purple above, 5-nerved, smooth; awn (when present) straight, very fine, 6-10 mm. long, close to the short, hyaline, minutely 2-toothed tip; keels of paleas green, crested, scabrid; anthers 3-5 mm. long; grain linear-oblong, semiterete, 3-5 mm. long, deeply channelled in front, adhering to the lemma and palea.

Introduced into Shillong in 1934 with grass seed from southern Europe.

3. *POA* Linn.

Spikelets mostly 2-6-flowered, in loose or close (rarely spike-like) panicles; rhachilla disarticulating above the glumes and between the lemmas, glabrous or scantily and minutely hairy. *Florets* hermaphrodite or the upper imperfect. *Glumes* thin membranous, keeled, acute or obtuse, 1-3-nerved. *Lemmas* membranous, sometimes rather firm, obtuse or acute, 5-7-nerved, awnless; callus small obtuse, often with a tuft of long wool. *Paleas* shorter than the lemmas, 2-keeled. Lodicules 2, more or less 2-lobed. *Stamens* 3. *Ovary* glabrous, styles short, free; stigmas plumose, laterally exserted. *Caryopsis* ovoid, oblong, or linear, often grooved, free or adherent to the palea; hilum punctiform, basal; embryo small.

Annual or mostly perennials; a large genus found throughout the world in the cooler parts and on the high mountains of the tropics.

Key to the species of *Poa*.

Annuals.

Ligules short; keels of palea scabrid. .. 1. *P. khasiana*.

Ligules long; keels of palea ciliate. .. 2. *P. annua*.

Perennials.

Stoloniferous.

Lower branches 5-nate. .. 3. *P. pratensis*.

Lower branches 2-3-nate. .. 4. *P. flexuosa*.

Not stoloniferous.

Lemmas webbed at the base. . . 5. *P. trivialis*.

Lemmas not webbed at the base. . . 6. *P. alpina*.

1. *Poa khasiana* Stapf in Hook f. F. B. I. VII (1897) 343.

Culms 30-60 cm. sub-erect from a rooting base, loosely tufted, smooth and glabrous; internodes 5-6, upper gradually longer, terete, not branched. *Leaf-blades* linear, long-acuminate tapering to a rather blunt point, 10-16 cm. long, 2.2-5 mm. broad, flat, flaccid, glabrous, smooth or slightly scaberulous on the margins; sheaths smooth and glabrous, rather finely striate, tight, shorter than the internodes; ligule short, membranous, erose or truncate.

Panicle narrowly pyramidal, lower branches 3-5-nate; branches scaberulous, 10-18 cm. long, lax, sometimes sub-secund; lower branches sub-rigid or flexuous, slender, at length spreading or deflexed, unbranched except at the tips or loosely branched almost from the base. *Spikelets* 4-6 mm. long, ovate-oblong, pale green; lower glume firm, 2.25 mm. long, 1-nerved, keeled, rough; upper glume firm, rather longer and broader, 3-nerved; lemmas oblong, obtuse 3.3-5 mm. long; tip shortly hyaline; nerves 5, distant; keels and outer nerves sparsely silky or sub-glabrous; palea linear-oblong, obtuse, 2-keeled; keels scabrid, just over 2 mm. long; anthers 1.25 mm. long.

KHASI and NAGA HILLS above 5,000 ft.

2. *Poa annua* Linn. Sp. Pl. (1753) 68.

An annual or sub-perennial, tufted, glabrous; culms erect from a geniculate, often rooting base, from a few cms. up to 30 cm. tall, slightly compressed below, smooth; internodes exserted or enclosed; sheaths rather loose slightly compressed, smooth; ligules oblong to ovate, up to 3 mm. long; blades linear-acute 2 cm.—3.5 cm. long, rarely longer, 2.5 mm.—3.5 mm. broad, flat, flaccid; margins scaberulous.

Panicle rather stiff, ovate, or lax up to 8 cm. long, often sub-secund, the lower branches 2-(rarely 3-5)-nate or solitary, spreading, ultimately often deflexed, up to 3.5 mm.

long, branched from the middle, smooth. *Spikelets* more or less crowded, oblong, ovate or lower lanceolate, green or sometimes purplish, 5-6 mm. long, 3-7-flowered; lower glume lanceolate, acute, 2.5-3 mm. long, 1-nerved to sub-3-nerved; upper slightly longer, ovate when expanded, 3-nerved; lemmas oblong, obtuse or sub-acute, 3.7 mm. long; margins and tip broadly hyaline; nerves slightly prominent, silkily ciliate below along the keel and the outer side nerves, rarely glabrescent, without connecting wool (in the type); palea slightly shorter than the lemmas; keels ciliate; anthers 1 mm. long; caryopsis oblong 1.2-2.5 mm. long.

3. *Poa pratensis* Linn. Sp. Pl. (1753) 67.

A tall, stout, stoloniferous grass. *Culms* up to 40 cm. tall, smooth and terete. *Leaf-blades* usually flat, mostly collected at the base of the culms, firm or soft, upper leaves short, lower up to 20 cm. long, linear in shape, glabrous or sparsely hairy on the surfaces, margins rough: sheaths tight, smooth; ligule about 2 mm. long, truncate or sub-obovate.

Inflorescence a lax or contracted panicle up to 12 cm. long, ovate or oblong, lower branches usually 5-nate, rarely 2-to 3-nate, naked below or rarely branched to the base, smooth or rough. *Spikelets* 4.5 mm. long, 3-5-flowered, ovate, acute, crowded, shortly pedicelled. *Lower glume* ovate-lanceolate, acute, 2.2-5 mm. long, 3-or 2-1-nerved, keel rough; margins hyaline, denticulate: upper glume rather larger, 3-nerved. *Lemmas* oblong, acute, 3.3-5 mm. long with prominent nerves, upper 1/5 or 1/6 hyaline; keel and lateral nerves silky to the middle or beyond: palea shorter than the lemma, keels scabrid-serrate; wool copious. Anthers 1.5-2 mm. long, linear.

BALIPARA FRONTIER TRACT, 10,000 ft.

Var. *alpigena* Blytt Norg. Flora, 130.

Balipara Frontier Tract, 9,000 ft., Kingdon-Ward.

4. *Poa flexuosa* Wahl. Flor. Carp. (1814) 22.

A small, tufted, slender stoloniferous grass. *Culms* 20-40 cm. tall, erect or geniculate at the base, smooth and

glabrous. *Leaves* narrowly linear-acute, or acuminate, flat, plicate or involute, 5-12.5 cm. long, glabrous, smooth or scaberulous, soft or rather firm; sheaths tight, lower scarious; ligule ovate, 2-4 mm. long.

Inflorescence a lax, pyramidal panicle, erect or nodding; lower branches capillary, flexuous, often spreading or deflexed, smooth, naked except towards the tips, 2-3-nate or solitary; pedicles scaberulous. *Spikelets* shortly pedicelled, 4-5 mm. long, green, usually suffused with purple. *Lower glume* 3-3.5 mm. long, thin, oblong-lanceolate, sub-obtuse or acute, 1-3-nerved, margins broadly hyaline, keel smooth or scaberulous: upper glume thin, rather longer than the lower, ovate-oblong, sub-obtuse or acute, 3-nerved, lateral nerves often short. *Lemmas* 4-5 mm. long, broadly oblong, hyaline at the tips, base shortly silky or glabrous; on the keel and nerves at the base, smooth or minutely scaberulous; palea rather shorter than the lemma, scabrid on the keels and dorsally most minutely puberulous between the keels; wool scanty or absent. *Anthers* 2-3 mm. long, linear.

BALIPARA FRONTIER TRACT, 9,000 ft., Kingdon-Ward.

5. *Poa trivialis* Linn. Sp. Pl. (1753) 67.

A glabrous, perennial, loosely tufted grass. *Culms* geniculate below, afterwards erect up to 60 cm. tall, terete or sub-compressed below, scabrid above, rarely smooth all along, about 3-noded. *Leaves* linear-acute 6.25 cm. long by 2.5-6.5 mm. wide, usually flat and flaccid, scaberulous; sheaths somewhat loose, striate, smooth or rough, the lower thin: ligules ovate-oblong, 4-6 mm. long.

Inflorescence an ovate to oblong, or even pyramidal panicle, 7.5-17.5 cm. long, erect or nodding; rhachis usually smooth below; branches in distant semi-whorls of 4-6 (mostly of 5) unequal, filiform, scaberulous, the longest up to 7.5 cm. long and undivided for often more than half their length, distantly or closely branched, ultimate branchlets 2-6-spiculate; lateral pedicels very short. *Spikelets* green or purplish, ovate to oblong, acute, 1.25-5 mm. long, 3-4-flowered; lower glume narrow, oblong, acute, scaberulous on the keel, 2.8-3.2 mm. long, 1-nerved; upper

glume ovate, acuminate, 3.75 mm. long, 3-nerved; side-nerves prominent; keel very scabrid. *Lemmas* oblong, acute, rather firm, lower 3.25 mm. long, pubescent along the keel to the middle, otherwise glabrous, side-nerves rather prominent; callus with a small tuft of very long wool; paleas 3 mm. long, 2-toothed; keels finely and very densely scabrid: anthers 2.5 mm. long: grain 1.25 mm. long, grooved.

Introduced into Shillong and escaped.

6. *Poa alpina* Linn. Sp. Pl. (1753) 67.

A densely tufted, usually low grass. *Culms* up to 35 cm. tall, terete, smooth. *Surculi* numerous at the base, clothed with short, distichous, thickish sheaths bearing firm, plicate-leaves with rough margins. Lowest sheaths of the stem distichous with thick bases enclosing the stem: upper sheaths much longer, smooth, open or not: leaves short, broadly linear, firm, acute; ligule of the lower and of the surculi leaves, very short, truncate, ciliolate. of the upper longer, ovate, somewhat coarsely denticulate.

Inflorescence a panicle broadly ovate in shape, 5 cm. long, but often small: usually dense, occasionally lax, lower branches mostly binate, more or less spreading, usually naked in the lower half: branchlets short, scaberulous. *Spikelets* crowded, variegated purple, brown and green, 4-6 mm. long, 3-6-flowered, broadly ovate in shape, lower short, upper long-pedicelled. *Lower glume* 3.5 mm. long, ovate-acute, margin broadly hyaline: upper similar but rather broader. *Lemmas* 3-3.5 mm. long, ovate-oblong obtuse, often emarginate, upper third hyaline, silky hairy below the middle, nerves obscure, wool absent; paleas hardly shorter 2-keeled; keels serrulate above the middle, ciliolate below. *Anthers* 1.5 mm. long.

BALIPARA FRONTIER TRACT, 10,000 ft.

4. GLYCERIA R. Br.

Spikelets few-to many-flowered, subterete or slightly compressed, in contracted or effuse panicles; rhachilla dis-articulating above the glumes and between the florets. *Glumes*

unequal, persistent, hyaline, 1-5-nerved, obtuse or acute, usually scarious; lemma broadly oblong or fan-shaped, dorsally rounded, firm, usually obtuse, 3-9-nerved; nerves often obscure, vanishing below the broadly hyaline, obtuse, rounded (rarely acute) or truncate tip; keels of palea smooth or scaberulous. *Lodicules* 2, minute or well developed. *Stamens* 3. Style short, distinct. *Caryopsis* terete or compressed, free or sub-adherent to the palea.

Usually tall, aquatic or marsh perennials, with creeping and rooting bases or with creeping rhizomes, simple culms, closed or partly closed sheaths, flat blades and open or contracted panicles.

Key to the species of *Glyceria*.

Spikelets 4-flowered or less.	..	.. 1. <i>G. tonglensis</i> .
Spikelets 5-7-flowered.	..	.. 2. <i>G. fluitans</i> .

1. ***Glyceria tonglensis*** C. B. Clarke in Journ. Linn. Soc. XV (1876) 119.

Stems prostrate and widely creeping in wet places, rooting at the nodes, rather tufted in drier habitats; culms slender, ascending, smooth and glabrous, 10-50 cm. long. *Leaf-blades* 10-30 cm. long, only 2-3 mm. broad, linear, flat, flaccid; tips obtuse or finely acute, glabrous and smooth on the surfaces, scaberulous on the margins: sheaths smooth and glabrous, finely striate, closed to the mouth; ligule membranous 2-3 mm. long, rounded or truncate, 2-auricled.

Inflorescence a raceme of peduncled spikelets sometimes as much as 30 cm. long, rachis slender, branches few-flowered. *Spikelets* pale green or purplish, rarely more than 4-flowered; rachilla flexuous, glabrous. *Lower glume* scarious, 2 mm. long, ovate-acute, 1-nerved; upper glume scarious, 2.75 mm. glabrous; margins irregularly lobed, 2-nerved or more. *Lemmas* 3 mm. long, chartaceous, ovate-oblong; tip rounded, hyaline, convex on the back, 7-nerved; nerves very prominent; palea hyaline as long as the lemmas or slightly shorter, 2-keeled, scaberulous on the keels, incurved. *Anthers* very small, linear-oblong. *Caryopsis* long, slender.

KHASI and JAINTIA HILLS in woods and marshes, 4-6,000 ft.

2. *Glyceria fluitans* (Linn.) R. Br., Prod. Fl. Nov. Holl. I (1810) 179.

A very elegant grass with a perennial root-stock, creeping extensively; culms weak, often spongy at the base, succulent, spreading widely, often floating with their lower leaves on the still surface of the water, 30 cm. to 2 m. long. *Leaf-blades* long, linear, roughish on both surfaces, radical ones flat, those of the stem folded; sheaths long, compressed, striated, smooth; ligules short, triangular, serrate..

Panicle simple, spreading or not, long, tapering; branches spreading and arching; the branchlets short and erect. *Spikelets* few, narrow, cylindrical, containing 5-7-ribbed florets usually variegated with green and white; the summit of the lowest lemma exceeds that of the glume. *Glumes* broadly oblong, the lower 2·2·5 mm. long, the upper 3·25-4·25 mm. long; lemmas broadly oblong the lowest 4·5-5·5 mm. long, membranous with a broadly hyaline tip, obovate or fan-shaped, rounded or truncate, rarely sub-acute, back rounded, 5-7-9-nerved: palea 2-keeled, 2-toothed, 2-nerved; keels narrowly winged upwards. Uppermost floret empty. *Lodicules* 2. *Stamens* 3. *Styles* 2, free.

In marshy places in and about Shillong, 4,500 ft., where it is found as an escape.

5. DACTYLIS Linn.

Spikelets laterally much compressed, very shortly pedicelled in dense compound, often secund clusters of a panicle or a false spike; rhachilla very tardily disarticulating above the glumes and between the lemmas or quite tough. *Spikelets* 3-7-flowered, hermaphrodite, or the uppermost rudimentary, exserted from the glumes. *Glumes* rigid, more or less hyaline, strongly keeled, sub-equal or the lower shorter, 1-3-nerved. *Lemmas* oblong, rigid, sub-herbaceous, mucronate or shortly awned, 5-nerved, keeled; keel ciliate; callus 0 or obscure. *Paleas* slightly shorter than the lemmas, 2-keeled. *Lodicules* 2, bilobed. *Stamens* 3. *Ovary* glabrous; styles distinct; stigmas plumose, laterally exserted. *Grain* enclosed by lemma and palea, oblong, strongly convex on the back, grooved in front, somewhat soft; embryo rather small; hilum punctiform, basal.

A temperate genus ascending to high altitudes in the tropics.

***Dactylis glomerata* Linn. Sp. Pl. I (1753) 71.**

A perennial grass; culms shortly ascending, geniculate or not, tufted, from a short oblique rhizome, rather robust, 30-60 cm. high, simple, glabrous, smooth or slightly rough below the panicle, 2-3-noded; internodes more or less slightly exserted; leaves mostly crowded at the base, glabrous; sheaths tight, striate, lower more or less compressed and keeled (particularly those of the innovation shoots), pallid, sub-persistent or breaking up into fibres, upper terete, rough or almost smooth; ligules oblong, acute, up to 7.5 mm. long; blades linear, tapering to an acute point, 10-30 cm. long, or longer, 4-10 mm. broad, flat flaccid, rough on the upper surface and along the margins, striate.

Panicle erect, 2.5-15 cm. long; cluster of spikelets crowded into a dense (usually lobed) terminal false spike with or without 1-4 (rarely more) distant branches below it; these erect or spreading, straight or flexuous, terminated by similar clusters or groups of clusters; axis, branches and branchlets scabrid or pubescent in the upper part, the latter often minutely hispid or ciliate. *Spikelets* oblong, 6-10 mm. long, light green, often concave on the inner surface; glumes 2.5-5 mm. long, glabrous to pubescent; lemmas about 5 mm. long, tips obtuse, sides scaberulous to pubescent; mucro or awn up to 2.5 mm. long; keels of palea ciliate; anthers 3.3-5 mm. long; caryopsis 2.5-3 mm. long.

Introduced into Shillong in 1934 as a fodder grass. It is now common in the station.

6. *VULPIA* Gmelin.

Spikelets laterally compressed after flowering, 1-7-flowered: rhachilla slender, disarticulating at the base and between the fertile lemmas. *Glumes* very unequal, the lower minute or obsolete, or like the upper, subulate to subulate-lanceolate but much shorter, 1-nerved; the upper usually 3-nerved. *Lemmas* subulate-lanceolate, tapering into a

straight awn, back rounded, faintly 5-nerved: paleas entire or minutely 2-toothed, 2-keeled; lower one to several florets bisexual, the uppermost reduced. *Lodicules* 2, hyaline. Stamens 1-3. Styles 2, free. *Grain* linear, back strongly compressed, concave in front, enclosed within the lemma and palea, adhering to the latter or to both: embryo small.

Annual or perennial erect grasses. *Leaves* very narrow, involute or convolute. *Panicles* contracted narrow, spikelets usually more or less secund, seated on clavate pedicels.

***Vulpia myuros* (Linn.) Gmel., Fl. Bad. I (1805) 8.**
Syn. *Festuca myuros* Linn. Sp. Pl. (1753) 74.

An annual tufted grass with slender culms geniculate at the base, up to 30 cm. tall, glabrous, smooth. *Leaves* linear, tapering to an acute point, 2·5-15 cm. long by 1·25-2·5 mm. wide, flaccid or firm, puberulous or scabrid on the upper surface, otherwise glabrous and smooth; sheaths (particularly the upper) rather loose, smooth, glabrous; ligules very short, often obtusely auricled.

Inflorescence a spike-like panicle, erect or nodding and flexuous, narrow and often secund, 5-25 cm. long: rhachis filiform, acutely triquetrous, scabrid on the angles; branches fascicled or 2-nate and very unequal, or solitary, racemose from the base or the uppermost reduced to a solitary spikelet. *Spikelets* 8-12·5 mm. long, loosely 3-6-flowered. *Lower glume* reduced to a minute scale or subulate like the upper but much shorter than it, nerveless or 1-nerved; upper 3·5·3 mm. long, setaceously acuminate, 1-nerved. *Lemmas* linear-lanceolate, acuminate in profile: awn 7·5-25 mm. long, fine, scabrid; stamen 1; anthers 4-1 mm. long; grain 3·5 mm. long.

BALIPARA FRONTIER TRACT, 10,000 ft.. Kingdon-Ward.

7. BROMUS Linn.

Spikelets laterally compressed, pedicelled on the branches of a loose or dense panicle, rhachilla disarticulating above the glumes and between the florets. *Florets* exserted from the glumes, usually numerous, hermaphrodite,

or the uppermost reduced. *Glumes* more or less unequal, acute to acuminate, persistent; lower 1-7-nerved; upper 3-9-nerved. *Lemmas* lanceolate to broadly oblong, entire or 2-toothed at the tip, rounded on the back or keeled, 5-13-nerved, usually awned; awn terminal or slightly distant from the tip (sub-terminal) straight or recurved but not geniculate. *Paleas* 2-keeled, with ciliate keels. *Lodicules* 2. *Stamens* 3. *Ovary* with a 2-3-lobed terminal hairy appendage. *Caryopsis* oblong or linear-oblong, usually adherent to the lemma and palea or to the latter only.

Annual or perennial grasses with linear flat leaf-blades, erect or nodding panicles and rather large spikelets.

A genus of wide distribution mainly in temperate regions.

Key to the species of *Bromus*.

Perennials.

Awn as long as or shorter than the lemma. . . 1. *B. asper*.

Awn longer than the lemma. 2. *B. himalaicus*.

Annuals.

Spikelets often drooping, secund, long awned. 3. *B. tectorum*.

Spikelets erect, not secund, short awned. . . 4. *B. unioloides*.

1. *Bromus asper* Murr., Prod. Stirp. Gotting. (1770) 42.

Culms 60 cm.-2 m., erect or ascending from a geniculate base, smooth, glabrous. striate, nodes villous or glabrous. *Leaf-blades* flat, flaccid, linear, tapering to a fine point, 30-45 cm. long, 4 mm. to 15 mm. wide, covered with scattered villae on the upper surface; undersurface glabrous but scaberulous, many nerved; margins scabrid; sheaths markedly striate, covered with retrorse hairs, margins often densely hairy; ligule short, obtuse and ciliate.

Inflorescence a nodding panicle up to 30 cm. long usually contracted but may be loose; rhachis stout below, scabrid or smooth, slender and angled above. *Branches* 2-nate or the lower 3-5-nate, up to 15 cm. long. *Spikelets* seated upon long or short, flexuous or straight, pedicels scarcely inflated at the tip, up to 3.5 cm. long, loosely 7-9-flowered. *Lower glume* lanceolate, 1-nerved, keeled and

scabrid on the keel, 1 cm. long. *Upper glume* lanceolate, 1.4 cm. long, strongly 3-nerved, the centre nerve being prolonged into short awn, scabrid on the nerves. *Lemmas* 1.5 cm. long, ovate-lanceolate, strongly 7-nerved, 2-lobed, the centre nerve issuing as an awn up to 1.5 cm. long, antrosely scabrid. *Palea* hyaline, 2-keeled and ciliate on the keels; margins infolded; rhachilla pubescent. *Stamens* 3; anthers 2 mm. long.

NAGA HILLS, Japvo, 9,800 ft.

2. *Bromus himalaicus* Stapf ex Hook. f. in. F.B.I. VII (1897) 358.

A perennial grass erect from a very short root-stock. *Culms* up to 70 cm. tall. Leaves 15-25 cm. long by 3-7 mm. broad, linear, contracted below, tapering above to a fine acuminate point, pubescent on both surfaces, scabrid on the margins, many-nerved.

Inflorescence a panicle (very often reduced to a raceme) 15-24 cm. long; rhachis scaberulous or scabrous above, smooth below; branches 2-nate or the lower 3-5-nate, spreading or deflexed, unequal; lowest up to 7.5 cm. long, simple or sparingly divided. *Spikelets* up to 2.5 cm. long, linear-oblong in shape, green, loosely 9-flowered; rhachilla sub-scaberulous. *Lower glume* 5-7.5 mm. long, narrowly lanceolate, keeled on the back, 1-nerved; upper glume 7.5-8.5 mm. long, broader. *Lemmas* up to 1.25 mm. long, 5-7-nerved, rounded on the back, tip and margins hardly hyaline, glabrous, pubescent or rigidly hairy towards the margins; palea obtuse, 2-keeled, rigidly ciliate on the keels. *Anthers* 3, linear-oblong, 1.5-2 mm. long. *Grain* 5 mm. long, linear-oblong, plano-convex, adherent to the glume and palca.

BALIPARA FRONTIER TRACT, 10,000 ft.

3. *Bromus tectorum* Linn. Sp. Pl. (1753) 77.

An annual grass with culms up to 45 cm. tall, erect or ascending, glabrous or pubescent; leaf-blades 7.5 cm. long

by 3 mm. broad, linear, acute, flaccid, hairy; sheaths hairy, rarely glabrous; ligule ovate, lacerate.

Inflorescence a flaccid, nodding panicle, up to 12.5 cm. long: rhachis smooth or nearly so: branches 3-6-nate, capillary, flexuous, often decurved with erect tips, sparingly divided. *Spikelets* green, somewhat cuneiform in shape, 1.25-2.5 cm. long, green, loosely few-to many-flowered; rhachilla scabrid. *Lower glume* 5-8.5 mm. long, lanceolate, acute, 1-to (rarely) 3-nerved, tip and margins hyaline: upper glume 8-12.5 mm. long, oblong-lanceolate, 3-to 5-nerved. *Lemmas* from 12.5 mm. to nearly 17 mm. long, thin, oblong-lanceolate, acutely 2-fid, 5-7-nerved, puberulous or scabrid above or all over, tip and margins hyaline, awned from the tip or below it: awn up to 2 cm. long, straight or slightly curved: palea 2-keeled, long and loosely ciliate on the keel. *Anthers* 3, 1 mm. long. *Grain* 8-10 long, linear-oblong, dorsally compressed, ventrally concave or folded.

BALIPARA FRONTIER TRACT, 10,000 ft., Kingdon-Ward.

4. *Bromus unioloides* H.B.K., Nov. Gen. et Sp. I (1815) 151. Syn. *B. catharticus* Vahl, Symb. Bot. II (1791) 22.

An annual grass. *Culms* tufted, weak, erect or more often geniculately ascending; roots many, fibrous. *Leaves* linear, tapering to a fine point, up to 20 cm. long, 5 mm. wide, soft, flaccid, minutely scabrous or smooth, glabrous on both surfaces; margins cartilaginous, minutely toothed; sheaths tight, striate, glabrous and smooth or very minutely scaberulous; ligules membranous, 3-4 mm. long, convex or slightly erose.

Inflorescence a few-flowered lax panicle, rhachis and branches angled and scabrid; branches rarely divided, increasing slightly in diameter from below upwards, each crowned with a solitary spikelet. *Spikelets* ovate to ovate-lanceolate, up to 2.5 cm. long by 7 mm. broad, 3-6-flowered: lower glume 5-6-nerved, lanceolate, margins scarious, tip blunt, 7.5 mm. long, keeled and scabrid on the keels; upper glume 9-10 mm. long, 9-nerved, tip blunt, keel scabrid; lemmas 12-15 mm. long, broadly lanceolate, chartaceous,

creamy-white in the lower two-thirds, pale green above, 11-13-nerved; callus naked, scabrid on the nerves on the dorsal surface, shortly awned; rhachilla triangular in section, ciliate on the frontal angle, produced and crowned with a sterile floret: palea 4-10 mm. long, 2-keeled, scabrid on the keels. *Grain* narrowly ellipsoidal, 6 mm. long.

This species has been identified with the earlier *B. catharticus* Vahl but the latter is a very dubious species. A native of temperate South America it is now widely spread throughout the tropics. An important fodder grass.

Found in Laban, Shillong, KHASIA & JAINTIA HILLS, 5,000 ft. Probably introduced.

8. FESTUCA Linn.

Spikelets laterally compressed, frequently curved, pedicelled on the branches of open or contracted panicles; rhachilla disarticulating above the glumes and between the florets. *Florets* 2 to many, exserted from the glumes, hermaphrodite or the uppermost reduced. *Glumes* usually nearly equal, acute, keeled, membranous 1-8-(rarely 5-)-nerved. *Lemmas* lanceolate to lanceolate-oblong, awnless, mucronate or with a straight awn from the tip, membranous or rigid, rounded on the back or keeled towards the apex, 5-7-nerved. *Palea* 2-keeled. *Lodicules* 2. *Stamens* 3. *Ovary* glabrous or minutely pubescent at the top. *Caryopsis* tightly enclosed by the lemma and palea, oblong.

Tufted perennials with flat, folded or rolled leaf-blades. A large genus with numerous species.

Key to the species *Festuca*.

Vernation of all leaves conduplicate :—

Lemmas dull; culms upto 30 cm. .. 1. *F. valesiaca*.

Lemmas shining; culms 45-60 cm. .. 2. *F. rubra*.

Vernation of leaves convolute :—

Awn twice as long as the lemma :—

Ovary glabrous. 3. *F. gigantea*.

Awn about equal to the lemma :—

Ovary hispidulous. 4. *F. leptopogon*.

1. *Festuca valesiaca* Schleich. ex Gaud. Agrost. Helvet. I (1828) 242.

A tufted perennial. *Culms* up to 30 cm. tall, nodes 2, both in the lower portion, slender, rigid, erect. *Leaf-blades*

5-15 cm. long, setaceous, green or glaucous in colour, smooth, ridged; sheaths of innovations, tight, smooth, open to near the base, persistent; ligule short, obscurely auricled.

Inflorescence a short, stiff, contracted panicle. *Branches* erect, solitary or 2-nate. *Spikelets* 4-5 mm. long, 3-4-flowered, oblong, broadly ovate when open, pale green or purplish, seated on short pedicels. *Lower glume* lanceolate, acute or sub-acute, 1.25-1.5 mm. long. *Upper glume* similar in shape, about 3 mm. long. *Lemmas* 3-4 mm. long, 5-nerved, pruinose, smooth or scaberulous, awned; awn shorter than the lemma; *palea* oblong-lanceolate, 2-toothed, scabrid on the keels. *Ovary* glabrous. *Anthers* .75-1.5 mm. long. *Lodicules* 2, minute, obliquely ovoid. *Grain* 1.5 mm. long, ventrally grooved, adherent to the palea and often to the lemma.

BALIPARA FRONTIER TRACT, 9,000 ft., Kingdon-Ward.

2. *Festuca rubra* Linn. Sp. Pl. (1753) 54.

Culms ascending from a geniculate base or erect, striate, smooth, internodes 2. Extravaginal innovations are frequent, either ascending or stoloniferous. *Leaf-blades* setaceous, 8-12 cm. long, (cauline leaves linear and flat), rather thick, green, 3-7-nerved, sub-acute, or almost obtuse, smooth; sheaths of innovations tight, closed almost to the mouth, smooth; those of the flowering stem split; *ligule* very short, truncate, ex-auricled.

Inflorescence a panicle 8-12 cm. long, very variable, narrow, nodding and secund or erect, rather dense and ovate, rhachis scabrid; branches solitary or lowest binate, divided from or near the base; spikelets 10 cm. to 1.6 cm. long, oblong, loose, 4-9-flowered, green or variegated, glabrous or hairy and ciliate. *Lower glume* lanceolate, acuminate, 1-nerved, nerve percurrent or sub-excurrent, 9 mm. long; upper glume 8 mm., ovate-lanceolate; lemmas strongly involute, oblong-lanceolate, margins above broadly hyaline, faintly 5-nerved, awned; awn up to 2.5 mm. slender; palea equalling the corresponding glume in length linear-oblong, shortly 2-fid; keels ciliolate. *Lodicules* obliquely ovate, sub-2-lobed. *Anthers* 2-3 mm. long. *Ovary* glabrous, save

for 1 or 2 hairs. *Grain* 3·5 mm. linear-oblong, grooved, sometimes adherent to both lemma and palea; hilum rarely equal to the grain in length.

KHASI HILLS, 5-6,000 ft.

Var. *Clarkei* Stapf.

Extravaginal innovations very rare, slender; leaves sub-setaceous; cauline rarely flat, panicle 7·5 cm.-12·5 cm. nodding; branches few sub-second; lowest up to 7·5 cm. rigid or flexuous, mostly obliquely erect; spikelets 1·25 cm. pale green; lower glume 5 mm.; upper glume 6 mm.; lemmas 6·7·5 mm.; awn up to 6 mm. *Anthers* 1·3·5 mm.; grain 3·5 mm. long.

KHASI HILLS, 5-6,000 ft.

3. *Festuca gigantea* Vill., Hist. Pl. Dauph. II (1786) 110.

A perennial grass with loosely tufted stems. *Culms* 60-80 cm. tall from a short rootstock with fibrous roots, smooth, with 3-5-nodes. *Leaves* 12·5-30 cm. long, amplexicaul, linear to linear-lanceolate, tapering to a fine acuminate point, smooth and glabrous, scaberulous on the margins; sheaths smooth, terete; ligule very short, truncate, glabrous.

Inflorescence an ovate or oblong-ovate panicle, 10-35 cm. long, nodding; branches solitary or the lower 2-nate, spreading, flexuous, scabrid; branchlets few-spiculate, spreading or appressed, pedicels short or the lower sometimes equal to the spikelet in length. *Spikelets* linear-lanceolate in shape, about 1·25 cm. long, pale green in colour. *Lower glume* membranous 2·5-3·5 mm. long, subulate-lanceolate, 1-nerved or obscurely 3-nerved at the base, margins white hyaline. *Upper glume* membranous, lanceolate, 3-nerved. *Lemmas* 7·5-8 mm. long, oblong-lanceolate, acute, or the tip shortly bifid, margins narrowly hyaline, minutely puberulous below the tip, nerves faint, awned; awn sub-terminal, straight or flexuous, twice as long as the lemma; palea oblong-lanceolate, 2-toothed, keels minutely scaberulous. *Anthers* 2·5-3·5 mm. long. *Grain* 5 mm. long, tightly adherent to the palea.

BALIPARA FRONTIER TRACT, 9,000 ft., Kingdon-Ward.

4. ***Festuca leptopogon* Stapf ex Hook. f., F.B.I. VII (1897) 354.**

A tufted perennial; root-stock short, roots fibrous. *Culms* 60-120 cm. high. *Leaves* 4-30 cm. long, linear, finely acuminate. flat, dark green, many nerved; base rounded; margins hardly scaberulous. *Ligule* up to 3 mm. long, truncate.

Inflorescence a panicle 15-30 cm. long, open or contracted, erect or nodding; branches scabrid, distant, dividing from near the base; branchlets few, distant, more or less appressed, lateral pedicels very short. *Spikelets* 2-3-flowered, linear-lanceolate; rhachilla scabrid, disarticulating above the glumes and between the florets. *Lower glume* wedge-shaped, 1-1.5 mm., 1-nerved, with narrow hyaline margins. *Upper glume* 2.5 mm., 3 nerved, with hyaline margins, ovate-oblong with a blunt tip, minutely scabrid on the dorsal nerve below the tip. *Lemmas* 7-8 mm. long, 5-nerved, 2-lobed at the apex, glabrous except for a minute pubescence below the 2 acute lobes, hyaline on the margins. A straight scabrid awn 7 mm. long issues from the sinus. *Palea* glabrous 2-keeled, very minutely scabrid on the keels, as long as or slightly longer than the corresponding lemma. *Lodicules* 2, 2-horned. *Anthers* 1 mm. long. *Ovary* minutely hispidulous on top. *Grain* 3.5 mm. long, linear-oblong, free or adherent to the base of the palea; top hispid; groove shallow.

KHASI HILLS, 5-6,000 ft. NAGA HILLS, 7,000 ft.

9. **CYNOSURUS** Linn.

Spikelets of two kinds, fascicled, collected in a dense unilateral, spiciform, terminal panicle, sterile and fertile together; fertile spikelets nearly covered by the sterile; sterile spikelets consisting of two glumes and several narrow, acuminate, 1-nerved lemmas on a continuous rhachilla: fertile spikelets 2-3-flowered, the glumes narrow, the lemmas broader, rounded on the back, tipped with a short awn, the rhachilla disarticulating above the glumes.

Annual or perennial tufted grasses with narrow flat

leaves and dense spike-like panicles. *Lodicules* 2, acuminate. *Stamens* 3. *Styles* short, free.

Temperate grasses often found at high altitudes in the tropics.

Cynosurus cristatus Linn. Sp. Pl. (1753) 72.

A perennial grass; culms 30-60 cm. tall, tufted, somewhat flattened or sub-terete, erect or geniculate at the base, smooth and glabrous; sheaths somewhat loose, striate, often slightly keeled, shorter than the internodes, smooth and glabrous; leaf-blades lanceolate-acuminate, narrow, up to 10 cm. long, 3 mm. wide, smooth, glabrous, midrib distinct; ligules oblong, truncate, membranous, 1.5 mm. long.

Inflorescence a spike-like panicle on a sinuate rhachis, 3-8 cm. long. *Spikelets* in pairs imbricate, secund, the pedicelled sterile and covering the sessile fertile spikelets. *Sterile spikelets* consisting of 2 glumes and several narrow, 1-nerved lemmas on a sinuate continuous rhachilla. *Fertile spikelets* several-flowered on an articulate rhachilla continuous beyond the uppermost fertile floret and surmounted by a rudimentary floret. *Lower glume* 4.5 mm. long, lanceolate, acuminate, sharply keeled, strongly 1-nerved, aristate, scabrid on the keel. *Upper glume* 5 mm. long, similar in shape. *Lemmas* ovate-acute, 5-nerved, rounded on the back and scabrid, 4.5-5 mm. long, awn 1 mm. long; palea hyaline with 2 parallel nerves, scabrid on the keels. *Stamens* 3, 2.5 mm. long.

Introduced into Shillong as a fodder grass and now often found as an escape.

4. HORDEEÆ.

Annual or perennial herbs; leaf-sheaths usually with small auricles at the mouth; blades narrow; spikelets 1-to many-flowered, solitary or in clusters of 2 to 6, mostly hermaphrodite and sessile, or the lateral spikelets of a cluster sometimes shortly pedicelled and male or barren, alternating on opposite sides of the continuous or jointed rhachis of solitary spikes or spike-like racemes; rhachilla disarticulating above the glumes and between the florets or continuous in cultivated races; glumes well developed; lemmas at length indurated, 5-to 9-nerved, awnless or awned from the tip; lodicules 2; stamens 3; styles 2; caryopsis free or adhering to the lemma or palea.

Key to the genera of *Hordeæ*.

Spikelets solitary, 2- or more- flowered.	..	1. Triticum.
Spikelets in threes, 1-flowered.	..	2. Hordeum.

1. TRITICUM Linn.

Spikes terminal, solitary; rhachis excavated opposite the spikelets, articulate or inarticulate. *Spikelets* solitary, distichous, tumid, few flowered. *Glumes* two, persistent, rigid, often unequal-sided, obtuse or shortly awned. *Lemmas* oblong or ventricose, back rounded or keeled upwards, muticous or 1-to 3-awned, 5-9-nerved; paleas as long, 2-keeled; keels ciliate. *Lower floret* hermaphrodite, upper male or barren. *Lodicules* 2. *Stamens* 3. *Styles* 2.

Grain oblong, ventrally grooved, often hairy, free within the lemma and palea or adhering to the latter.

Annual or perennial (biennial) herbs, often tufted, with flat leaves and thick spikes.

Triticum aestivum Linn. Sp. Pl. (1753) 85.

An annual herb with fibrous roots. *Culms* 80-150 cm. tall, erect or tufted, smooth, hollow or sometimes solid

above. *Leaves* flat, linear-lanceolate or broadly linear, acuminate, somewhat rough; sheaths smooth; ligules short, truncate.

Inflorescence an erect spike, curved at maturity, irregularly four-sided, more or less compact, rarely somewhat loose: rhachis continuous, hairy on the margins. *Spikelets* solitary, imbricate on the opposite sides of the rhachis, laterally compressed, ovoid, glabrous or hairy, whitish or reddish, 3-5-flowered, more often four, the uppermost sterile. *Glumes* about 1 cm. long, sub-equal, broad, ovate, oblong, persistent, rigid, unequal-sided, obtuse or shortly awned. *Lemmas* oblong, ventricose, back rounded or keeled upwards, muticous or 1-3-awned, hermaphrodite; paleas as long as the lemmas, 2-keeled, keels ciliate. *Lodicules* 2. *Stamens* 3. *Grain* oblong, ventrally grooved, free within the lemma and palea or adhering to the latter.

The wheat plant is cultivated by the Sherdukpen, BALIPARA FRONTIER TRACT, 6,000 ft.

2. HORDEUM Linn.

Spikelets in groups of three at the nodes of the disarticulating (except in cultivated forms) rhachis of a dense spike; rhachilla tough, produced as a bristle beyond the floret, sometimes bearing a rudimentary lemma. *Floret* hermaphrodite in the intermediate spikelet, male or barren (hermaphrodite sometimes in cultivated races) in the lateral. *Glumes* subulate or bristle-like or narrowly linear and awned, rigid, 1-3-nerved, persistent, more or less collateral and together forming a kind of involucre. *Lemmas* lanceolate, sub-involute, rounded on the back, gradually produced into a bristle-like awn, 5-nerved. *Palea* about as long as the lemma, (exclusive of the awn), 2-keeled, narrowed, deeply folded between the keels. *Lodicules* 2, lanceolate, ciliate or ciliolate, hyaline. *Stamens* 2. *Ovary* villous at the top; style very short terminal; stigmas laterally exerted, plumose; caryopsis tightly enclosed and usually adhering to the lemma and palea, ovoid-oblong or narrow-oblong, rounded on the back, grooved in front; embryo short; hilum filiform, very long.

Hordeum vulgare Linn., Sp. Pl. (1753) 84.

An annual herb with fibrous roots. *Culms* 60-120 cm. tall, erect, glabrous. *Leaves* linear, flat, elongate, broad, scaberulous, with two auricles at the base; sheaths loose glabrous, striate; ligule short, truncate.

Inflorescence a spike, 2-10 cm. long, erect at first, afterwards curved, somewhat compressed, irregularly four-sided. *Spikelets* in threes seated in the cavities of the inarticulate rhachis, 1-flowered or the lateral imperfect; rhachilla jointed below the lemma and produced into a short pubescent or scabrid stipe. *Glumes* two, persistent, rigid, narrow, the outer of each cluster together often resembling an involucre. *Lemma* lanceolate up to 1 cm. long, rounded on the back, 5-nerved, tapering into a long straight or recurved awn: palea as long as the lemma, deeply folded between the keels. *Floret* hermaphrodite in the centre spikelet, hermaphrodite or male in the lateral spikelets. *Lodicules* 2. *Stamens* 3. *Grain* ovoid or narrowly oblong, grooved in front, tip usually villous, tightly enclosed in the lemma and palea and adhering to the latter or to both: embryo small.

The Barley plant. Occasionally cultivated in the BALIPARA FRONTIER TRACT and found as an escape in Shillong, 4-6,000 ft.

5. ARUNDINEÆ.

Perennials, usually with tall, stout, sometimes woody culms; leaf-blades long and flat; spikelets hermaphrodite, or unisexual with the sexes on different plants, 2-to 10-flowered, arranged in often large panicles; rhachilla disarticulating above the glumes or lowest floret and between the florets; glumes hyaline or membranous, similar or the lower smaller; lemmas somewhat similar to the glumes, acuminate, awnless or awned from the tip, 1-to 5 (rarely more)-nerved, enveloped by long hairs either from the rhachilla or from the back of the lemmas (at least in the fertile florets); lodicules 2; stamens 2 to 3.

Key to the genera of *Arundineæ*.

Spikelets hermaphrodite :—

- | | | |
|--------------------------------------|-------|-----------------------|
| Lemmas glabrous; rhachilla bearded. | .. | 1. Phragmites. |
| Lemmas with silky hairs on the back. | .. | 2. Arundo. |
| Spikelets unisexual. | .. .. | 3. Cortaderia. |

1. PHRAGMITES Trin.

Spikelets loosely 3-10-flowered, awnless, in large panicles; rhachilla disarticulating above the lowest and between the following lemmas, slender, glabrous, joints very short; lowest floret male or abortive; the following hermaphrodite, the uppermost reduced. *Glumes* thin, unequal to sub-equal, lanceolate, acute, more or less rounded on the back, 3-nerved, or the lowest sometimes sub-nerved. *Lemmas* heteromorphous, the lowest linear-lanceolate, much longer than the subtending glume, otherwise of a similar structure, quite glabrous, persistent, the following lemmas very thin, linear, long and more or less caudate-acuminate, 3-nerved; middle nerve percurrent; side nerves fine, short; callus long, slender, with very long silky-hairs. *Palea* linear-oblong about 1/2 the length of the lemmas, 2-keeled. *Lodicules* 2 (or sometimes 3 in the lowest floret) obovate, 2-3-nerved, glabrous. *Stamens* 3, or 2 in the lowest floret. *Ovary* glabrous; in the

lowest floret rudimentary or quite suppressed; style distinct, rather short; stigmas laterally exerted, densely plumose. *Caryopsis* loosely enclosed by the lemma and palea, free, oblong, semiterete; hilum oblong, short, basal; embryo about half as long as the grain.

Perennials with creeping rhizomes, extravaginal innovation shoots, and tall, sheathed, annual or perennial culms; blades flat; ligule a narrow, ciliate, membranous rim; panicle lax, usually very large and much compound; spikelets conspicuously silky from the long callus hairs.

Phragmites karka *Trin. ex Steud.*, Nom. Ed. II 324.

A very large and tall grass up to 7 m. with rather close, jointed, hollow stems, spreading widely by means of stolons. *Leaves* distichous, linear to broadly lanceolate, tip subulate; ligule a ridge of short stiff hairs.

Inflorescence a large decompound panicle, 15-60 cm. long, by 10-40 cm. broad, very silkily-hairy at the base, branches filiform, distinctly scaberulous; pedicels glabrous. *Spikelets* several-flowered, 1.1-1.8 cm. long. *Lower glume* oblong-lanceolate, membranous, 3-5-nerved. *Upper glume* 5 mm. long, 3 nerved, oblong-lanceolate, membranous. *Lowest lemma* up to 12.5 mm. long, narrowly oblong-lanceolate, acute, convolute, 3-nerved, male or neuter, persistent. *Upper lemmas* subulate-lanceolate, sub-aristate, successively a little shorter than the lower; paleas much shorter than the lemmas, to 3 mm. long, faintly 2-nerved, glabrous, ending in two short horns or tip obtuse. *Stamens* 1-3. *Styles* 2, terminal, free, stigmas plumose. *Lodicules* 2, obtuse. *Rhachilla* above the lowest lemma penicillate with long white hairs.

Very common in wet places all over the plains and ascending in the hills up to 4,000 ft.

Var. cincta *Hook. f.*

This variety, which is distinguished from the type by possessing long villous pedicels, is found near Kohima, NAGA HILLS, 5,000 ft.

2. ARUNDO Linn.

Spikelets 2-7-flowered, laterally compressed, in very compound panicles; rhachilla disarticulating above the

glumes and between the lemmas; joints short, glabrous; florets hermaphrodite, the uppermost reduced. *Glumes* equal, broadly lanceolate, shortly acuminate, keeled, membranous, 3-5-nerved. *Lemmas* more or less equalling the glumes, ovate to lanceolate-ovate, acuminate, finely bifid or entire, long hairy below, 5-9-nerved, 3 nerves more or less percurrent or excurrent, the rest short, the middle nerve often produced into a short fine bristle; callus short, shortly bearded. *Paleas* slightly exceeding half the length of the lemma, 2-keeled. *Lodicules* 2, obovate, nerved, glabrous. *Stamens* 3. *Ovary* glabrous; style distinct, almost as long as the laterally exerted plumose stigmas. *Caryopsis* obovoid-oblong; broad, loosely enclosed by the lemma and palea; hilum basal, punctiform; embryo almost wholly one side of the grain.

Perennial with creeping rhizomes, extravaginal shoots, and very tall and stout culms; sheaths slightly exceeding the internodes; leaves rather evenly distributed over the culms; blades long, broad, flat; ligules very short, membranous.

Arundo Donax Linn., Sp. Pl. (1753) 81.

Culms erect from a creeping rhizome 2-6 m. high, stout, many noded, simple or branched, glabrous and smooth, or slightly rough towards the tips of the blades, numerous and evenly distributed along the culm; blades linear-lanceolate, tapering to a very fine point, 30-60 cm. long, 2-7 cm. wide, more or less drooping.

Inflorescence a large terminal de-compound plumose panicle, 30-60 cm. long, erect; branches scaberulous, erect or drooping. *Spikelets* 8-10 mm. long, light-brown in colour, 2-7-flowered, laterally compressed; rhachilla disarticulating above the glumes and between the florets; joints short, glabrous. *Lower and upper glumes* sub-equal, broadly lanceolate-acuminate, glabrous, keeled on the back, 3-5-nerved. *Lemmas* 6-10 mm. long, as long as the glumes, ovate to ovate-lanceolate in shape, acuminate, 2-toothed or entire, 5-9-nerved, middle nerve produced into a short arista, long hairy on the back in the lower half, hairs 5-6 mm. long; callus short, sparsely beard-

ed. *Palea* about half the length of the lemma, 2-nerved, 2-keeled. *Lodicules* 2, obovate, glabrous. *Stamens* 3; anthers 3 mm. long. *Ovary* glabrous; styles distinct, almost as long as the laterally exerted plumose stigmas. *Grain* 2.5 mm. long.

Common. Hills and plains.

3. CORTADERIA Stapf.

Spikelets 12-14 mm. long, naked, on flexuous and slightly scabrous pedicels usually shorter than the spikelet, numerous, 2-4-flowered. *Glumes* 8-12 mm. long, the lower slightly shorter than the upper, narrow, 1-nerved, papery, thin attenuate into a rather long point, mostly 2-toothed. Lemma 3-nerved, hyaline, narrow, glabrous in male plants, villous in female plants, 6-7 mm. long, awned: awn 4-5 mm. long. *Palea* 4 mm. long, hyaline, sub-2-keeled, pubescent at apex.

Diœcious grasses. *Culms* tall tufted; blades long, narrow, mostly basal; margins rough. *Panicle* included or exerted, up to 75 cm. long, oblong, pyramidal, feathery, silvery-white or pink; axis smooth, branches whorled or one-half whorled and one long branched; branchlets numerous, spiculate nearly to the base.

Cortaderia selloana (Schult.) Aschers. et Graeb.
Syn. Mitteleur. Flor. II (1900) 325.

A dioecious perennial reed growing in large tufts. *Culms* erect, stout, up to 3 m. tall. *Panicle* plumose, silvery or pink, 40-100 cm. long. *Spikelets* 2-3-flowered, the female with long silky hairs, the male naked: *Glumes* white, papery, long, slender. *Lemmas* with a long slender awn.

Introduced and grown for ornament.

6. ERAGROSTÆ.

Annual or perennial herbs; leaf-blades narrow; spikelets 2-to many-flowered, mostly hermaphrodite, usually laterally compressed, pedicelled in open or contracted panicles, or secund and sessile or sub-sessile in spikes or spike-like racemes; rhachilla usually disarticulating above the glumes and between the florets, rarely persistent or disarticulating below the glumes and the spikelets then falling entire: glumes usually persistent, membranous to coriaceous, usually shorter than the lowest lemma; lemmas mostly exserted from the glumes, rarely enclosed by them, membranous to coriaceous, scarcely changed at maturity, 1-to 3-nerved, entire, emarginate or 2-to 4-lobed at the tip, awnless, mucronate or with a straight awn from the tip or sinus, rarely with the three nerves running out into awns; lodicules 2; stamens 2 or 3; grain loosely or tightly enclosed by the lemma and palea, sometimes with a free pericarp.

Key to the genera of *Eragrostæ*.

Lemmas entire or minutely lobed at the apex :—

Lemmas awned from the tip; spikelets in spike-like panicles.

1. **Elytrophorus.**

Lemmas awnless, or if awned spikelets not as above :—

Spikelets in loose or contracted panicles :—

Upper glume 3-nerved.

2. **Eragrostis.**

Upper glume 1-nerved.

3. **Desmostachya.**

Spikelets in spikes or spike-like racemes :—

Spikes solitary, terminal.

4. **Eragrostiella.**

Spikes not solitary :—

Spikes usually digitate; grains with free pericarp :—

Axis terminating in a spikelet.

5. **Eleusine.**

Axis terminating in a mucro.

6. **Dactyloctenium.**

Spikes racemosely arranged; grains with adnate pericarp.

7. **Leptochloa.**

Lemmas deeply lobed at the tip, usually awned :—

Spikelets in solitary spikes.

8. **Tripogon.**

Spikelets in panicles.

9. **Neyraudia.**

1. ELYTROPHORUS Beauv.

Spikelets laterally compressed, small, awned, sessile in dense, globular to oblong clusters on the branches of a continuous or interrupted, lobed, false spike; rhachilla disarticulating above the glumes and between the lemmas, glabrous. *Florets* 2-7 (mostly 3 or 4) shortly exerted or included within the glumes, hermaphrodite or the upper reduced. *Glumes* persistent, nearly equal or the upper slightly longer, keeled, narrow, mucronate, membranous, 1-nerved.

Lemmas similar to the glumes, mucronate or shortly awned from the entire tip, 3-nerved, membranous. *Palea* shorter than the lemmas, 2-keeled with both keels, or only one, broadly winged. *Lodicules* 2. *Stamens* 1-3, minute. *Ovary* glabrous. *Caryopsis* free between the lemma and palea.

An annual grass with flat leaf-blades and cylindrical or lobed spike-like panicles.

Elytrophorus spicatus A Camus in Lecomte, Flor. Gen. de l'Indo-Chine VII. 547. Syn. E. articulatus Beauv. Agrost. (1812) 67, t. 14, f. 2.

Annual. *Culms* tufted, erect or geniculate at the base, 12-60 cm. high, slender, simple or branched, up to 4-noded, minutely pubescent or glabrous and smooth. *Leaf-blades* linear, acute, 2-24 cm. long, 1.5-5 mm. wide, flat and slightly rough, glabrous or with a few scattered hairs below; leaf-sheaths thin, loose, glabrous and smooth; ligule truncate, up to 1 mm. long, thin, glabrous.

Inflorescence a narrow, continuous, or more or less interrupted (especially downward) false spike 5-34 cm. long, bristly, up to 1 cm. wide (including the bristles), cylindrical, green or straw-coloured; rhachilla scaberulous or densely and minutely pubescent; branches erect, densely spiculate to the base, forming dense, globular, ovoid or oblong clusters of spikelets, the lower .5-2.5 cm. long and distant by 1.5 cm.; the upper shorter and closer together or contiguous. *Spikelets* 2-4 mm. long. *Glumes* lanceolate, finely acute, shortly mucronate, including the mucro

1·8-3 mm. long, ciliolate on the margins. *Lemmas* lanceolate 1·2-5 mm. (mostly 2-2·5 mm.) long, tapering into a curved or straight bristle, up to 2 mm. long, ciliolate; *paleas* ·8-2 mm. long, wings up to ·4 mm. wide and toothed or ciliate. *Anthers* ·4 mm. long. *Caryopsis* ·6-·8 mm. long.

Nongkhlow, KHASI & JAINTIA HILLS, 4,000 ft. and Haltugaon, GOALPARA 500 ft. Plains of SYLHET.

2. ERAGROSTIS Beauv.

Spikelets laterally compressed, rarely terete, awnless, pedicelled on the branches of open or contracted panicles; rhachilla disarticulating above the glumes and between the lemmas, or tough and persistent, rarely falling entire, glabrous, rarely minutely hairy. *Florets* 2 to many, hermaphrodite or the upper reduced, exserted from the glumes. Glumes equal or unequal, membranous, 1-nerved or the upper 3-nerved. *Lemmas* loosely to densely imbricate, acute or obtuse, entire, awnless, membranous to thinly coriaceous, 3-nerved, glabrous or very rarely hairy; *paleas* as long as or shorter than the lemmas, 2-keeled, deciduous or persistent with the rhachilla. *Lodicules* 2. *Stamens* 3 or 2. *Ovary* glabrous. *Grain* linear-oblong to globose or ovoid, enclosed by the lemma and palea and falling with the lemma only.

Annual or perennial grasses of varying habit, with narrow leaf-blades.

A genus with numerous species throughout the warm regions of the world.

Key to the species of *Eragrostis*.

Paleas ciliolate on the keels :—

Margins of lemmas ciliate. 1. *E. coarctata*.

Margins of lemmas eciliate :—

Panicles effuse :—

Plants viscous. 2. *E. viscosa*.

Plants not viscous. 3. *E. tenella*.

Panicle spiciform, contracted. 4. *E. riparia*.

Paleas scaberulous or smooth on the keels :—

Lemmas less than 1 mm. long, spikelets

2-3 mm. long, 1-1·25 mm. wide :—

Spikelets densely clustered, 6-14-flowered.

branches more or less solitary. 5. *E. diarrhena*

- Spikelets loose, scattered, few-flowered,
 branches of panicle usually whorled. .. 6. *E. japonica*.
 Lemmas over 1 mm. long :—
 Leaf-blades glandular on the margins;
 keels of lemmas usually glandular :—
 Spikelets oblong or ovate-oblong,
 2.75-3.5 mm. wide. .. 7. *E. cilianensis*.
 Spikelets narrow-oblong, 1.5-2 mm.
 wide. .. 8. *E. poæoides*.
 Leaf-blades and lemmas eglandular :—
 Spikelets broadly ovate or broadly
 oblong, 3 mm. wide. .. 9. *E. unioloides*.
 Spikelets lanceolate to narrowly oblong
 .75-2.5 mm. wide :—
 Lemmas closely imbricate with flat
 margins, ovate to broadly ovate in
 side view, annual. .. 10. *E. tremula*.
 Lemmas loosely imbricate or contigu-
 ous with usually incurved margins,
 lanceolate to oblong or narrowly ovate
 in side view :—
 Spikelets 2-2.5 mm. wide, oblong. 11. *E. gangetica*.
 Spikelets 1-1.5 mm. wide, linear to
 lanceolate or oblong :—
 Perennials :—
 Spikelets blackish or bluish-grey;
 panicles lax; pedicels long. .. 12. *E. nigra*.
 Spikelets silvery, crowded, al-
 most secund; pedicels short. .. 13. *E. zeylanica*.
 Annuals :—
 Spikelets circa 1 mm. wide;
 lower branches whorled. .. 14. *E. pilosa*.
 Spikelets circa 1.5 mm. wide;
 lowest branches solitary. .. 15. *E. nutans*.

**1. *Eragrostis coarctata* Stapf ex Hook. f. in F.B.I.
 VII. (1897) 313.**

A perennial grass with thick fibrous roots. *Culms* tufted, geniculately ascending from a nodose, branched stock; base clothed with short hard sheaths. *Leaves* linear, terminating in a sharp point, usually flat, sometimes convolute, up to 9 cm. long by 6 mm. broad, smooth and glabrous, somewhat glaucous; sheaths tight, close fitting, smooth and glabrous or sparingly hairy, striate, collar bearded with long hairs; ligules a ring of short hairs.

Inflorescence a much contracted elongate, subspiciform panicle, often lobed, occasionally lax; rhachis stout, scaberulous, angled; branches very short, hispid in the axils. *Spikelets* crowded on short pedicels, 2-3 mm. long by 1.5 mm. broad. *Glumes* almost equal, 1.25-1.5 mm. long. *Lemmas* 1.5-2 mm. long, 3-nerved, membranous, ciliate on the margins especially towards the base, lateral nerves green, prominent; palea 2-keeled, as long as the lemma, very strongly ciliate on the keels. *Stamens* 3, .5 mm. long. *Caryopsis* ovoid-ellipsoid, .5 mm. long, light to dark brown.

This grass has only been found on Tura Top, GARO HILLS, 3-4,000 ft.

2. *Eragrostis viscosa* Trin. in Mem. Acad. Petersb. ser 6. I (1831) 397. Syn. *E. tenella* Roem. et Schult. var. *viscosa* Stapf in Hook. f. F.B.I. VII (1892) 315.

A tufted, sweet-scented grass, 12-30 cm. high, the panicles occupying the greater part of the plant. *Stem* and rhachis of panicle, pedicels and glumes with scattered microscopic glands. *Leaves* flat or convolute, erect, patent, 2.5-3.5 cm. long, with rigid tips; sheaths loose, striate, often glandular; ligule-base and mouth of sheath with very long cilia.

Panicles dense, cylindrical or oblong, 7-18 cm. long and up to 3.5 cm. broad, often occupying more than half the plant; branches very numerous, more or less spreading, equal, sometimes opposite or 2-nate, but never in interrupted whorls, rhachis usually glabrous rarely obscurely bearded at the nodes. *Spikes* 5-to 20-flowered, often purplish, usually about 3 mm. long; rhachilla readily breaking up. *Glumes* almost equal or the lower very slightly shorter than the upper, .75-1.25 mm. long, obtuse. *Lemmas* broadly elliptic in shape, obtuse or rounded, with the keel minutely scaberulous, 1-1.25 mm. long. *Palea* nearly as long as the glume, rigidly ciliate on the keels. *Grain* pale-brown, polished, about .5 mm. long.

KAMRUP & NOWGONG.

3. Eragrostis tenella Roem. et Schult. Syst. II (1817) 576.

A loosely tufted annual. *Culms* erect or geniculately ascending, 12-50 cm. high, very slender, wiry, 3-5-noded, unbranched or frequently branched, glabrous and smooth. *Leaf-blades* narrowly linear, tapering to a fine point. 2-12 cm. long, 1-3 mm. wide, flat or rolled when dry, soft, spreading, glabrous and smooth. *Leaf-sheaths* shorter than the internodes, bearded at the mouth with soft spreading hairs, the remainder usually glabrous and smooth; ligule reduced to a fringe of short hairs.

Panicle loose and open, or contracted and rather dense, ovate to oblong in outline, 5-13 cm. long, 1.5-3.5 cm. wide, straw-coloured, green or purplish; rhachis usually with spreading hairs at the nodes; branches very fine, glabrous; pedicels 1-5 mm. long. *Spikelets* oblong to broadly oblong, 1-4 mm. long, 3-9-flowered; rhachilla articulated, breaking up from above downwards. *Glumes* ovate-oblong to oblong, obtuse or slightly acute, 1-nerved; lower .5-1 mm. long, upper .7-1.3 mm. long. *Lemmas* oblong, very obtuse, almost truncate when flattened, .8-1.2 mm. long, thinly membranous; paleas as long as the lemmas, ciliate on the keels with spreading rigid hairs. *Anthers* very minute.

Very common in the plains in sandy places.

4. Eragrostis riparia Nees in Wight Cat. n. 1787. Syn. *E. tenella* Roem. et Schult. var. *riparia* Stapf in Hook f. F.B.I. VII (1897) 315.

Perennial. *Culms* wiry, 12.5-50 cm. tall, terete, smooth and glabrous, often densely tufted. *Leaf-blades* linear-lanceolate, 1-6 cm. long, up to 4 mm. broad, tapering to a point, flat but rolled in the dried condition, smooth and glabrous except at the base where a few long hairs may be seen; sheaths shorter than the internodes, smooth and glabrous, tight or loose; with a few long hairs at the auricles and on the collar; ligules a membranous ring, erose or truncate, ciliate.

Inflorescence a very narrow, contracted, spiciform panicle, 1.25-6 cm. long, branches sub-filiform or capillary,

rhachis glabrous. *Spikelets* 1-3 mm. long, long or short pedicelled, 3-9-flowered; lower glume 1 mm. long; upper 1.3 mm. long. *Lemmas* 1-1.5 mm. long, lateral nerve near the middle of the sides; paleas 1-1.25 mm. long, keeled, keels ciliate with stiff cilia which are shorter than the width of the expanded palea. *Anthers* .4 mm.; caryopsis ovoid, .4 mm.

Common in the plains. Said to be a good fodder grass.

5. *Eragrostis diarrhena* Steud. Syn. Pl. Glum. (1854) 226. Syn. *E. interrupta* Beauv. Agrost. (1812) 71 var. *diarrhena* Stapf in Hook. f. F.B.I. VII (1897) 316.

An annual or perennial grass. *Culms* up to 80 cm. tall, terete, smooth, glabrous and polished. *Leaves* linear, narrowed at the base, acuminate, slightly rough on the upper surface and on the margins; flat, up to 15 cm. long, sheaths rather loose, slipping from the culms, smooth and glabrous, striate, scarious on the margins; ligule membranous, short.

Panicle contracted, long and narrow, made up of numerous fascicled spiculate branches giving the panicle a lobed appearance; rhachis stout, smooth and glabrous; branches numerous, filiform, closely spiculate almost to the base, usually erect, rarely spreading. *Spikelets* equal to or longer than their pedicels, up to 3 mm. long by 1 mm. wide or less, often reddish or pinkish in colour, linear, occasionally ovate in shape. *Glumes* sub-equal .75 mm. long, acute, 1-nerved; *lemmas* very obtuse, almost truncate, 1 mm. long with green nerves; *palea* shorter than the lemmas; *keels* scaberulous. *Stamens* 2. *Caryopsis* obovoid.

Common in the plains in moist sand. A good fodder grass and liked by stock.

6. *Eragrostis japonica* Trin. in Mem. Acad. Petersb. ser. 6. I (1831) 405. Syn. *E. interrupta* var. *tenuissima* Stapf in Hook. f. F.B.I. VII (1897) 316.

A tufted annual. *Culms* erect or geniculate at the base, slender to stout, 15-70 cm. high, simple or branched, 1- to 4-noded, glabrous and smooth. *Leaves* glabrous and smooth;

blades linear-acute, 2-20 cm. long, 1·5-4 mm. wide, flat or convolute; ligule reduced to a ciliolate rim.

Panicle linear, lanceolate to ovate-oblong in outline. open and loose or contracted, 6-25 cm. long; rhachis glabrous, smooth below and scaberulous towards the apex, branches spreading, in whorls or clusters, or solitary, divided from or near the base; branches very slender but rigid, scaberulous 5-8 cm. long; pedicels up to 2 mm. long. *Spikelets* linear compressed, 2·3-5 mm. long, 1 mm. wide, 6-10-flowered; rhachilla disarticulating between the florets. *Glumes* acute or obtuse, hyaline, 1-nerved; lower lanceolate to ovate, 6-8 mm. long; upper ovate to oblong, 8-1 mm. long. *Lemmas* lanceolate to lanceolate-oblong in profile, 7-1·5 mm. long, thinly membranous. *Paleas* 2-keeled nearly as long as the lemmas, keels scaberulous or smooth, falling with the lemma and rhachilla-joint at maturity. *Anthers* 2, 2 mm. long. *Grain* ovoid to ellipsoid, 3-5 mm. long.

From the plains up to 7,000 ft.

7. *Eragrostis cilianensis* (All.) Link ex Lutati, in *Malpighia* XVIII (1904) 386. Syn. *E. major* Host. *Gram. Austr.* IV (1809) 14.

An annual grass. *Culms* up to 90 cm. tall but usually much shorter, erect or geniculate at the base, glabrous, smooth, branchy, leafy. *Leaf-blades* rather soft, smooth and glabrous, up to 18 cm. long by 9 mm. wide, tapering from the base to a fine point, glandular on the margins; leaf-sheaths smooth and glabrous, rather loose at the base; ligule a ciliolate rim.

Panicle open or contracted up to 20 cm. long, rather rigid, ovate-oblong in shape, rhachis rigid, smooth; branching to the second or third degree, spreading or suberect, capillary; pedicels shorter than the spikelets. *Spikelets* crowded, up to 60-flowered, usually much less, 4-6-flowered, and then only 6 mm. long, yellowish or olive-grey in colour; rhachilla tough, zigzag, with smooth internodes. *Glumes* ovate-acute with scabrid keels; the lower smaller than the upper 1-(sometimes 3-) nerved, the upper 3-nerved; lemmas broadly ovate, acute, sometimes apiculate, 2 mm. long,

strongly nerved; palea obovate, much curved, shorter than its lemma, with ciliolate keels. *Stamens* 3, anthers .4 mm. long. *Grain* globose, .6 mm. in diameter, microscopically rugulose, reddish brown.

A good fodder for cattle. Not common.

8. *Eragrostis poaeoides* Beauv. Agrost. (1812) 162. Syn. *E. minor* Host. Flor. Austr. I (1827) 135.

An annual grass with densely tufted, slender, erect culms 15-40 cm. tall, smooth and glabrous. *Leaf-blades* rounded at the base, linear, tapering to a fine point, smooth and glabrous or with a few hairs near the throat on the upper surface, up to 20 cm. long by 5 mm. wide; margins definitely glandular; leaf-sheaths shorter than the culms, smooth and glabrous, striate, somewhat keeled; ligule a densely pubescent rim.

Panicle oblong or ovate, sometimes contracted, rhachis smooth and glabrous, terete grooved; branches angled, scabrid on the angles, sparingly branched; nodes of the rhachis glabrous. *Spikelets* linear-oblong, olive-grey or even purplish-grey in colour, longer than the pedicels, up to 7 mm. long, 1.5 mm. wide, up to 12-flowered; rhachilla tough. *Glumes* sub-equal or the upper a little longer, 1.1-2 mm. long, 1-nerved, acute; lemmas overlapping, ovate-acute, minutely scabrid between the nerves in the upper third, strongly nerved; palea obovate, 1 mm. long, keels minutely scabrid. *Anthers* minute. *Grain* up to .75 mm. long, rounded, dorsally slightly flattened.

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9. *Eragrostis unioides* Nees ex Steud. Syn. Pl. Glum. (1854) 264. Syn. *E. amabilis* Wight et Arn. ex Nees in Hook. et Arn., Bot. Beech. Voy. 251 (non Linn.).

An annual grass. *Culms* loosely tufted or solitary, erect or geniculately ascending, 14-45 cm. high, very slender, unbranched, 2-3-noded, glabrous and smooth. *Leaves* mostly basal; blade tapering from an abruptly contracted base to a fine point, 3 to 10 cm. long, 2-5 mm. wide, flat, thin, glab-

rous or with a few scattered hairs above, smooth except for the rough margins; sheaths longer or slightly shorter than the internodes, glabrous except for a few hairs at the mouth. smooth; ligule reduced to a very narrow rim.

Panicle lanceolate, ovate or oblong in outline, 5-14 cm. long, 3-3.5 cm. wide, green or reddish purple, becoming straw-coloured. *Spikelets* strongly compressed, 20-50-flowered, rhachilla straight, persistent. *Glumes* lanceolate to ovate, finely acute, sub-equal, up to 2 mm. long, 1-nerved, membranous. *Lemmas* closely imbricate, ovate or ovate-elliptic in profile, obtuse or slightly acute, 2 mm. long, finely membranous, minutely granular, side-nerves straight and prominent; paleas almost as long as the lemmas and falling with them at maturity, keels narrowly winged, minutely ciliolate. *Anthers* minute. *Grain* oblong or elliptic-oblong, compressed .6-.8 mm. long.

Very common in the plains and up to 2,000 ft. Easily recognised by the reddish panicle and compressed spikelets.

10. *Eragrostis tremula* Hochst. ex Steud. Syn. Pl. Glum. (1854) 269.

Annual. *Culms* 15-80 cm. high, densely tufted, erect or geniculately ascending. *Leaf-blades* linear-lanceolate, tapering to a fine point, glabrous or sparsely hairy, 2.5-20 cm. long, rounded at the base, margins eglandular and very finely serrate; sheaths smooth, glabrous, changing to a mauve colour when dry; ligule a rim of short stiff hairs.

The inflorescence is a very large, lax, effuse and nodding panicle, pyramidal or oblong-ovate in shape, up to 50 cm. long by 30 cm. broad, rhachis stout, angled, scaberulous; branches solitary, slender, ascending, scaberulous; branchlets capillary, with long white-hairs in all axils of the panicle; pedicels capillary, very slender, shorter or longer than the spikelets; spikelets up to 60-flowered, linear in shape, compressed, glabrous, green or tinged with violet, up to 2.5 cm. long. *The glumes* are sub-equal, 1.5-1.2 mm. long, ovate-acute, membranous, 1-nerved, keeled; keel scaberulous. *Lemmas* broadly ovate-obtuse in shape when flattened, 1.5-2 mm. long; palea obovate-oblong, keels scabrid, persistent.

Stamens 3. *Lodicules* 2. *Caryopsis* nearly globose, compressed or one side obscurely rugulose.

A good fodder grass; fairly common in the plains and in rice fields in MANIPUR.

11. *Eragrostis gangetica* Steud. Syn. Pl. Glum. (1854) 266. Syn. *E. elegantula* Stapf in Hook f. F. B. I. VII (1897) 318.

A perennial grass. *Stems* tufted 30 cm. to 1 m. high, stout, smooth, shining, simple or branched, sub-erect. *Leaves* few, 5-20 cm. long, very narrow, convolute, rigid, quite smooth, glaucous, linear, tapering to a fine point; sheaths glabrous, except the mouth which is sometimes bearded; ligule a minutely ciliolate rim.

Panicle oblong, 5-15 cm. long, nodding; branches solitary, rather distant, often long, suberect or the lower spreading; rhachis glabrous; pedicels of spikelets short. *Spikelets* 4-6 mm. long, linear to linear-oblong, 10-30-flowered; rhachilla tough, glabrous, persistent, the internodes short. *Lower glume* 1.6 mm. long, ovate-oblong, acute, 1-nerved; upper slightly longer, 1-nerved. *Lemmas* broadly ovate, sub-acute, reaching to nearly 2.5 mm. long; palea deciduous, slightly shorter than its lemma, keels scaberulous. *Stamens* 3; anthers about 1 mm. long, yellow. *Grain* oblong, about .8 mm. long, brown.

Valuable fodder. Very common in the plains and hills. In ASSAM this plant is exceedingly glaucous, often appearing bluish at a distance.

12. *Eragrostis nigra* Nees ex Steud. Nom. ed. 2. I (1840) 563.

A very variable perennial. *Culms* 15 cm.-1 m. high in the more robust plants, erect, stout, (in less robust forms slender and sub-erect), simple or branched, leafy at the base. *Leaves* in small forms basal and flat 15 mm. long, 2.5-3 mm. broad, in more robust plants elongate, lanceolate, tapering to a sharp point; margins smooth or scarcely scabrid, surfaces smooth, a few hairs on the margins at the base; sheaths narrowly terete or obscurely compressed,

mouth bearded, margins smooth or ciliate; ligule a ciliate rim.

Inflorescence a large, spreading panicle, ovate or oblong, lax many- or few- flowered, up to 60 cm. long, much branched; branches usually in whorls or fascicles rarely solitary or geminate; rhachis glabrous at the nodes. *Spikelets* linear to oblong, 4-4.5 mm. long, olive grey, seated on pedicels which are usually longer than the spikelets. *Glumes* sub-equal, acuminate, strongly 1-nerved, keeled, membranous, 1.5-1.75 mm. long; lemmas ovate-acute, 1.5-1.8 mm. long, palea obtuse, denticulate, persistent; stamens 3, anthers .5 mm. long. *Caryopsis* short, truncate at both ends, .7 mm. long, dorsally slightly grooved.

Exceedingly common in the hills, 2-4,000 ft.

13. *Eragrostis zeylanica* Nees et Mey. in Nov. Act. 204. Syn. *E. elongata* of F. B. I. VII (1897) 319, not of Jacq.

A robust perennial with numerous roots, tufted. *Culms* up to 30 cm. tall, sub-erect or prostrate, often sub-erect from a geniculate base; upper internodes very long. *Leaves* for the most part basal, narrow, erect, flat or rolled, often rigid, hirsute towards the base and on the upper surface; sheaths tight, smooth, bearded at the throat, auricles glabrous or without auricles; ligules merely a ring of short hairs.

Inflorescence an oblong or oval panicle, very variable. erect, very lax 5-12 cm. long, sometimes contracted; principal axis slender, straight, glabrous, smooth or slightly scabrid on the angles; branches solitary, often simple, rarely branched, distant, horizontal, filiform, scaberulous, often hairy in the axils. *Spikelets* very shortly pedicelled, rather crowded, 5-9 mm. long, linear-acute, sides almost parallel, 25-30-flowered, greyish or dark-brown; rhachilla somewhat robust, rigid, persistent, smooth; glumes unequal, strongly 1-nerved, the lower 1-1.5 mm. long, the upper rather shorter, lanceolate; lemmas 1-2 mm. long, firm, coriaceous, with hyaline margins, not punctate, broadly ovate-acuminate, laterally much compressed, keel almost straight, the lateral nerves being rather prominent; paleas

1·2-1·3 mm. long, persistent, linear-oblong, obtuse, keels well-marked, scabrid. *Stamens* 3, anthers very small. *Caryopsis* ovoid, globular, sub-globular or shortly sub-elliptic, ·5 mm. long, somewhat rugose.

So far this grass has only been obtained in the SURMA VALLEY. Common at Lowacherra, SYLHET.

14. *Eragrostis pilosa* Beauv. Agrost. (1812) 71.

An annual grass. *Culms* up to 30 cm. tall, geniculate at the base or more often erect, very slender, soft, densely tufted. *Leaves* narrowly linear, acuminate, often convolute, generally flat, rough on the margins and on the upper surface, glabrous; sheaths tight, smooth and glabrous except at the throat where the small auricles are hairy; ligules a ring of short hairs.

Inflorescence an erect, sometimes nodding, panicle, spreading at anthesis, broadly elliptic in outline, 5-10 cm. long, solitary or purplish in colour; rhachis filiform; nodes sometimes hairy; branches capillary, flexuous, scaberulous or almost smooth, bare at the base; pedicels almost as long as the spikelets. *Spikelets* 2·5-3 mm. long, rarely longer, erect, ovate or narrowly elliptic in outline, 4-10-flowered; rhachilla robust, flexuous, smooth; glumes very unequal, hyaline, lanceolate-acute; lower ·3·5 mm. long, ovate, nerveless; upper ·9-1 mm. long, ovate-lanceolate, acute, strongly 1-nerved, keel smooth; lemmas 1·2-1·3 mm. long, ovate-subacute, 3-nerved, the lateral nerves hardly prominent; palea almost persistent, sub-denticulate at the apex, keel smooth or nearly so. *Stamens* 3. *Caryopsis* narrowly obovoid or ellipsoid.

Not common; plains to 4,000 ft. Said to be an excellent fodder grass.

15. *Eragrostis nutans* Nees ex Steud. Nom. ed. 2. I (1840) 563. Syn. *E. stenophylla* Hochst. ex Miq. Anal. Bot. Ind. II (1851) 271 (in part).

Perennial. *Stems* densely tufted, 30-45 cm. high, erect or geniculately ascending, simple or branched; upper internodes long. *Leaf-blades* 7·5-12 cm. long, very narrow,

strict, rather stiff, usually convolute, smooth, sometimes quite flat, glabrous, not glaucous; sheaths smooth; ligule a narrow membranous ring.

Panicle ovate or oblong or sub-linear, sub-erect or nodding; branches rather distant, alternate, oblique, spreading when ripe, much divided upwards; rhachis slender, smooth; pedicels of spikelets filiform. *Spikelets* 4-6 mm. long, linear-oblong, 20-30-flowered, rhachilla zigzag. *Lower glume* .8 mm. long, upper 1 mm. long, lemmas ovate-oblong sub-acute, about 1.6 mm. long, with smooth keel; palea linear-oblong, caducous with the glumes, keels scabrid. *Stamens* 3, anthers minute. *Grain* globose or globosely ellipsoid, 2.5 mm. long, reddish-brown, smooth.

Common in the plains.

3. DESMOSTACHYA Stapf.

Spikelets linear, strongly laterally compressed, closely imbricate, alternate, sessile or sub-sessile on, and falling entire from, the slender rhachis of secund more or less distinctly 2-ranked spikes which are crowded into long narrow spike-like panicles; rhachilla tough. *Florets* numerous, hermaphrodite, rather loose. *Glumes* very unequal, membranous, 1-nerved, keeled. *Lemmas* ovate, acute or sub-acute, entire muticous, rigidly membranous, 3-nerved, acutely keeled, glabrous; side nerves evanescent upwards. *Paleas* slightly shorter than the lemmas, 2-keeled. *Lodicules* 2, rather large, hyaline, nerved at the base. *Stamens* 3. *Ovary* glabrous; *styles* distinct, slender; *stigmas* plumose, laterally exserted. *Caryopsis* loosely enclosed by the scarcely altered lemma and palea, obliquely ovoid, obtusely triquetrous; pericarp thin, adnate to the seed; embryo about 1/3 the length of the caryopsis; hilum small, basal, punctiform.

Rather coarse grasses.

Desmostachya bipinnata Stapf in Flor. Cap. VII. 632. Syn. *Eragrostis cynosuroides* Beauv. Agrost. (1812) 71, 162.

Perennial. *Culms* tall, ascending from a stout creeping

rootstock, .3-1 m. high, branching from the base, tufted. stout, smooth and glabrous, leafy; stolons very stout, covered with shining sheaths. *Leaf-blades* linear to linear-lanceolate, acuminate, tapering to a filiform tip, 15-40 cm. long, by 4-10 mm. wide, rigid, flat, margins scarcely thickened, hispid towards the base; sheaths leathery, glabrous, hairy at the mouth; ligule a ciliolate ridge.

Panicle very coarse, 15-45 cm. long by 1.3-3.8 cm. broad, narrowly pyramidal or columnar, often interrupted, common axis puberulous; branches many, short, about 2 cm. long, crowded from the base with sessile imbricating spikelets; branchlets rigid, spreading, glabrous or hispidulous. *Spikelets* sessile, secund, 2-seriate and crowded, deflexed, pale-brown, rather shining, 13 mm. long, up to 30-flowered; rhachilla tough, internodes very short. *Glumes* very unequal; lower .5 mm. long; upper 1.6-2 mm. long, ovate, acute, coriaceous; palea shorter than its lemma, subcoriaceous with minutely scabrid keels. *Stamens* 3; anthers .8 mm. long. *Caryopsis* .5-.6 mm. long, obliquely ovoid, laterally compressed, obscurely trigonous.

One sheet labelled "ASSAM" without locality, in the Kew Herbarium. Said to be an excellent desert fodder grass.

4. ERAGROSTIELLA Bor.

ERAGROSTIELLA Bor, genus novum graminacearum *Eragrosti* Beauv. affinis, a qua culmis gracilibus dense caespitosis et spiculis in racemis longis, terminalibus, simplicibus dispositis, distinguitur.

ERAGROSTIELLA Bor.

Spiculæ lineares vel ovato-oblongae, leviter vel valde lateraliter compressae, sub-secundae, sub-sessiles vel breviter pedicellatae, in racemis longis, terminalibus, simplicibus, gracilibus, laxae vel imbricatae dispositae; rhachilla continua vel inter anthoecia tarde disarticulans, internodiis glabris, angulatis, superne leviter incrassatis. *Anthoecia* 6-20, hermaphrodita vel summum sterile et plus minusve redactum. *Glumae* aequales, vel superior longior, carinatae; inferior 1-nervia, superior 3-nervia; lemmata imbricata, ovata vel lanceolata, apice mutica, dorso leviter vel valde carinata vel rotundata, acuta vel obtusa, membranacea

vel chartacea, glabra; paleae lemmatibus subaequilongae, vel paullo breviores, bicarinatae; carinae plus minusve alatae. *Stamina* 3. *Ovarium* glabrum. *Lodiculae* 2, cuneatae, carnulosae. *Styli* distincti, terminales; stigmata plumosa, ex anthoeciis lateraliter exserta.

Gramina perennia, dense caespitosa; vaginae basales persistentes; foliorum laminae angustae, filiformes, rare latae, coriaceae.

ERAGROSTIELLA Bor.

Spikelets linear to ovate-oblong, strongly or slightly compressed, shortly pedicelled or sub-sessile, in two rows, distant or crowded, in long, slender, terminal racemes; rhachilla tough, persistent, or tardily breaking up, glabrous, angled, slightly swollen at the top of the joint. *Florets* 6-20, hermaphrodite, or the uppermost more or less reduced. *Glumes* sub-equal, or the upper the longer, keeled, deciduous, the lower 1-nerved, the upper 3-nerved, glabrous; lemmas imbricate, ovate or lanceolate, slightly or strongly keeled on the back, acute or obtuse, membranous or chartaceous, glabrous; palea as long as the lemma, keeled, winged on the keels or not, often persistent on the rhachilla. *Lodicules* 2, small, cuneate, fleshy. *Stamens* 3. *Ovary* glabrous; style distant, terminal; stigmas plumose laterally exserted.

Perennial grasses, densely caespitose; leaves mostly convolute, filiform, rarely flat; ligule short; base of the culm covered with the remains of old sheaths.

Eragrostiella leioptera (Stapf) Bor. com. nov. Syn. *Eragrostis leioptera* Stapf in Hook f. F. B. I. VII (1897) 325.

Perennial. *Culms* densely tufted, bases covered with the remains of old sheaths, 30-60 cm. tall, erect, slender, strict, smooth and glabrous. *Leaf-blades* 20-30 cm. long, glabrous, stout, terete, pungent; sheaths short, slightly compressed and sub-keeled on the back, smooth and glabrous, shorter than the internodes, a few hairs at the mouth; ligule very narrow, hardly more than a rim with a few hairs.

Inflorescence a long slender, erect raceme 15-25 cm. long with the spikelets secund, erect, not crowded, dis-

tichously spreading, rhachis angular and smooth. *Spikelets* 8 mm.-1.25 cm. long, sub-sessile, oblong, compressed, 10-20-flowered. *The spikelets* are secund, a point which is not always apparent from herbarium specimens. *Glumes* sub-equal, tumid, about 1.75 mm. long or the lower shorter, lower distinctly keeled the upper dorsally rounded; lemmas broadly ovate, obtuse or subacute, 2.5 mm. long; palea as long as the lemmas, two-keeled, keels winged eciliate, hyaline. *Anthers* about 1.5 mm. long.

In certain depauperate forms of this grass it is found that the spikelets may consist of nothing but empty lemmas without even a palea. In well-developed plants it is common to find a few empty lemmas above the glumes.

Very common in the KHASI and JAINTIA HILLS, 5-6,000 ft.

The genus *Eragrostiella* comprises a number of grasses which have been hitherto included in *Eragrostis* but which differ very markedly in inflorescence and habit from the very great majority of the species in that genus. The main characteristics of the species placed in *Eragrostiella* are the spicate inflorescence and the tufted habit. Bentham in Jour. Linn. Soc. XIX (1882) 116 placed all these forms and the very different *Eragrostis cynosuroides* Beauv. in one section of *Eragrostæ* which he called *Plagiostachya*. Hook. f. in F.B.I. VII (1897) 324 separates *E. cynosuroides* Beauv. from the rest and placed it in a special section *Desmostachya* and retained the section *Plagiostachya* for those grasses with a spicate inflorescence. Stapf subsequently raised *Desmostachya* to generic rank and *Eragrostis cynosuroides* became *Desmostachya bipinnata* (Linn.) Stapf. There is no reason why *Plagiostachya* (of Hook. f.) should be maintained any longer as a section of the genus *Eragrostis* and I propose to raise it to generic rank under the name *Eragrostiella* Bor.

The following new combinations of Indian grasses are necessary. *Eragrostiella leioptera* (Stapf) Bor. comb. nov.; *E. bifaria* (Wight) Bor. comb. nov.; *E. brachyphylla* (Stapf) Bor. comb. nov.; *E. walkeri* (Stapf) Bor. comb. nov.; *E. collettii* (Stapf) Bor. comb. nov.; *E. nardoides* (Trin.) Bor. comb. nov.; *E. secunda* (Nees) Bor. comb. nov.

5. ELEUSINE Gærtn.

Spikelts laterally compressed, sessile, densely overlapping, in two rows on one side of the flattened rhachis; the rhachis terminating in a spikelet; rhachilla disarticulating above the glumes and between the lemmas or tough. *Florets* 3-12, hermaphrodite or the uppermost reduced, exserted

from the glumes. *Glumes* persistent, slightly unequal, keeled, obtuse or acute, membranous, lower 1-nerved, upper 1- to 5-nerved, with the nerves close to the keel.

Lemmas very similar to the glumes, 3-nerved or with an additional 2 nerves near the keel, the lateral nerves sometimes only prominent near the base. *Paleas* shorter than the lemmas, 2-keeled with the keels narrowly winged. *Lodicules* 2. *Stamens* 3. *Ovary* glabrous. *Grain* oblong to globose, free between the lemma and palea, with a loose delicate pericarp.

Annual or perennial grasses with flat or folded leaf-blades and spikes in a terminal umbel, sometimes one or more below, or in whorls towards the apex of the culms, rarely solitary.

Key to the species of *Eleusine*.

Spikes digitate.

Spikes slender, nearly glabrous at the base;

seeds oblong, obtusely trigonous. .. 1. *E. indica*.

Spikes stout, often incurved, pubescent at the base; seed globose. 2. *E. coracana*.

Spikes whorled. 3. *E. verticillata*.

1. *Eleusine indica* Gaertn. Fruct. I (1788) 8.

Annual. *Culms* loosely to densely tufted or solitary, erect or slightly geniculate, 10-75 cm. high, slender to stout, compressed, simple or branched, 2- to 3-noded, glabrous and smooth. *Leaves* usually crowded at the base; blades linear-acute 10-35 cm. long, 2-5 mm. wide, flat or folded, erect, thin to rigid, glabrous and smooth, rarely sparingly hairy; ligule very small or absent.

Inflorescence of digitate spikes, straight, slender to stout, 2-15 cm. long, usually with spikelets right to the base, 2-4 in a terminal umbel, occasionally with one or more below it, rarely solitary; rhachis pubescent to villous at the base. *Spikelets* glabrous, ovate or oblong, green, 3-7 mm. long, 3-8-flowered. *Glumes* lanceolate, acute or slightly obtuse; lower 2-3 mm. long; upper 3-4 mm. long; lemmas lanceolate, acute, 3-4 mm. long; paleas about two-thirds the

length of the lemmas. *Grain* oblong, 1.5-2 mm. long, transversely rugose.

Very common in plains and hills up to 5,000 ft. A good fodder for all stock; suitable for pasture.

2. *Eleusine coracana* Gaertn. Fruct. I (1788) 8 t. i.

Stouter than *E. indica*, up to 1 m. high, with leaves often far overtopping the stem, 30-60 cm. long, 5-6 mm. broad, with compressed, loose sheaths and ligules of hairs. *Spikes* 4-7, sub-erect, with ends or even the whole spike frequently incurved, rhachis of spikes often pubescent at the base, somewhat trigonous, or flattened on the back. *Spikelets* much congested, awnless, 3- to 5- flowered. *Lemmas* broader and more ovate than in *E. indica* and often with 1 to 2 nerves in the margins, variable in size and up to 5 mm. long. *Grain* globose, dark brown, smooth in some varieties, at other times somewhat rugose, with a depressed black hilum and slightly flattened on one side.

Often cultivated in the hills, 2-5,000 ft.

3. *Eleusine verticillata* Roxb. Flor. Ind. I (1832) 346.

Annual. *Culms* tufted, erect, 30-90 cm. high, slender to stout, simple or branched, smooth and glabrous. *Leaf-blades* linear, lanceolate, tapering to a fine point, up to 20 cm. and more long, up to 7 mm. wide, flat or folded, erect, thin, glabrous and smooth; sheaths compressed and keeled, glabrous and smooth; ligule thin, truncate, ciliolate, about 1 mm. long.

Spikes 6-20, scattered or in whorls towards and at the apex of the culms, 2-9 cm. long with spikelets right to the base, pale-green, at length straw-coloured; rhachis hairy at the base. *Spikelets* ovate or oblong, 4-7 mm. long, 6-12- flowered, pale-green. *Glumes* lanceolate; lower finely acute, about 3 mm. long, upper mucronate or slightly awned, about 4 mm. long. *Lemmas* spreading, ovate in profile, finely acute or acuminate, 3-4 mm. long, minutely 2-toothed with a mucro or short awn from the sinus, 3-nerved with the lateral nerves

prominent; paleas about 2/3rds the length of the lemmas. *Grain* oblong rugose, about 1 mm. long.

Said to have been found in the SURMA VALLEY.

6. *DACTYLOCTENIUM* Willd.

Spikelets laterally compressed, densely imbricate, usually spreading at right angles, sessile in 2 or more ranks on one side of the narrow flattened rhachis of digitate spikes; the rhachis projecting in a point beyond the spikelets, rhachilla slowly disarticulating above the glumes and not between the lemmas. *Florets* 3-5, hermaphrodite or the uppermost reduced. *Glumes* slightly unequal, keeled, 1-nerved; lower ovate to oblong, acute or obtuse, persistent; upper oblong-obtuse, mucronate or short awned. *Paleas* almost as long as the lemmas, 2-keeled. *Lodicules* 2, *Stamens* 3. *Ovary* glabrous. Grain oblong to globose, transversely rugose to nearly smooth, enclosed in a thin pericarp which disappears early.

Annual or perennial grasses with flat leaf-blades and spikes in a terminal umbel, rarely solitary.

Chromosome number 48.

***Dactyloctenium aegyptium* Beauv.** Ess. Agrost. (1812) 72.

Annual. *Culms* erect or usually ascending from a prostrate base, and rooting at the nodes, 22-80 cm. high, slender to moderately stout, 2- to 3- noded, glabrous and smooth. *Leaf-blades* linear, acute, 2.5-20 cm. long, 2.5 mm. wide, flat, loosely or densely ciliate on the margins and sometimes sparsely hairy on the surface with tubercle-based hairs or glabrous; sheaths shorter than the internodes, glabrous or scantily hairy, lower surface whitish and keeled; ligule very short, ciliate.

Spikes 2-6, rarely solitary, 1.5 cm. long, light or dark olive-grey, with spikelets right to the base, rhachis keeled, pubescent at the base, bare at the tip for 2-3 mm. *Spikelets* 3-4 mm. long. *Lower glume* 1.5-2.5 mm. long; upper glume 2 mm. long, mucronate or awned with an awn up to 2 mm. long. *Lemmas* 2.5-3 mm. long, mucronate or very short

awned; palea 2-keeled, keels narrowly or broadly winged, ciliate. *Anthers* 1.5 mm. long. *Grain* obovoid-globose, 1.1-1.5 mm. long, very rugose.

Common in the plains and hills. An excellent fodder, said to be strengthening for horses. The grain is edible.

7. LEPTOCHLOA Beauv.

Spikelets very minute, laterally compressed, alternate and unilaterally 2-seriate on the very slender, spiciform branches of a lax panicle, sessile or minutely pedicelled, not jointed at the base, rhachilla jointed at the base and between each lemma, produced between each lemma and often beyond the terminal. *Lower and upper glumes* subequal or unequal, oblong, lanceolate or almost linear-lanceolate, 1-nerved. *Lemmas* ovate (when flattened), 3-nerved, 1-nerved in the keel and usually 1 near each margin; palea shorter, 2-nerved. *Lodicules* cuneate. *Anthers* 3, short. *Styles* free. *Grain* oblong-obovoid, sub-globose or trigonous, invested by the glume and palea.

Annual, usually slender herbs. *Leaves* flat or involute.

Key to the species of *Leptochloa*.

- | | | |
|---|-------|---------------------------|
| Spikes up to 10 cm. long; spikelets 2-3-flowered, less than 2.5 mm. long; upper glume longer than first floret. | .. .. | 1. <i>L. filiformis</i> . |
| Spikes up to 10 cm. long; spikelets 4-6-flowered, 2.5 mm. or more long; upper glume shorter than first floret. | .. .. | 2. <i>L. chinensis</i> . |

1. *Leptochloa filiformis* Roem. & Schult. Syst. ii, 580.

An annual grass. *Stems* slender, up to 60 cm. tall, erect from a more or less geniculate base. *Leaf-blades* glabrous or sparsely hairy, 10-25 cm. long, up to 1 cm. broad, flat, flaccid, tapering to a point; sheaths smooth, glabrous or sparsely hairy; ligule very short, .5 mm. long or less, lacerate.

Spikes from 3 cm. up to 10 cm. or even longer, capillary. *Spikelets* very small, about 1.5 mm. long, shortly pedicelled,

about their own length distant from one another. *Lower glume* .75 mm. long, linear-lanceolate; upper glume about 1.25 mm. long; lemmas a little shorter, three-nerved, marginal nerves microscopically hairy; palea under 1 mm. long, re duplicate. *Grain* .5 mm. fusiform-oblong; pericarp adherent but slightly produced at each end.

Collected in CACHAR flowering in May.

2. *Leptochloa chinensis* Nees in Syll. Ratisb. I (1824) 4.

An annual, but much stouter plant than the former. *Stem* erect from a geniculate base, up to 5 mm. thick and 100 cm. tall. *Leaves* 15-40 cm. long, ligule short lacerate.

Inflorescence a panicle up to 30 cm. long; branches numerous, slender, simple, erect or spreading up to 10 cm. long. *Spikelets* about 2.5 mm. long, 4-6-flowered. *Lower glumes* lanceolate-subulate, .7 mm long; upper glume lanceolate up to 1.3 mm. long; lemmas broader lanceolate, 1.2 mm. long, 3-nerved, slightly pilose on the marginal nerves. *Grain* loose, obtusely trigonous, subrugose.

Very similar to *L. filiformis* and may only be a robust form of that plant. SURMA VALLEY.

8. *TRIPOGON* Roth.

Spikelets many-flowered, (florets, all but 1 to 2 terminal, perfect), 2-seriate and unilateral on a very slender terminal spike, not jointed at the base; rhachilla produced between the lemmas, jointed at the base. *Lower and upper glumes* unequal, distantly superposed, 1-nerved, empty, persistent; lower glume usually lodged in a furrow of the rhachis, and toothed or lobed on one side; upper glume entire or notched below the mucronate or apiculate tip. *Lemmas* ovate, dorsally convex, 2-fid and awned in the cleft, or 4-fid with the outer lobes awned, the inner membranous and rarely awned; palea broad or narrow, complicate. *Lodicules* 2. *Stamens* 3. *Styles* very short. *Grain* very narrow, free.

Slender densely tufted grasses. *Leaves* usually convolute.

Key to the species of *Tripogon*.

Lemmas 2-fid with an interposed awn, the lobes awned or not.

Awn as long as or longer than the lemma. 1. *trifidus*.

Awn shorter than the lemma. 2. *jacquemontii*.

Lemmas 4-fid, outer lobes awned or not, inner membranous. 3. *filiformis*.

1. *Tripogon trifidus* Munro ex Stapf, Kew Bull. (1892) 85.

A perennial. *Culms* erect, tufted, clothed at the base with old sheaths, smooth and glabrous. *Leaf-blades* setaceous, 15-75 cm. long, smooth and glabrous, ending in a capillary point; sheaths persistent ribbed, smooth and glabrous, rarely a few hairs at the mouth; ligule short.

Inflorescence a simple spike, 5-30 cm. long; rhachis somewhat flattened, angled, smooth and glabrous. *Spikelets* .4-1 cm. long, 6-10-flowered, pale olive-grey in colour, narrowly elliptic in shape, shortly pedicelled. *Lower glume* 1.5-2 mm. or more long, lanceolate, acuminate or aristate, broadly lobed on one side, the lobe sometimes being detached; upper glume 4.5-5.5 mm. long, lanceolate-acuminate. 2-toothed with a short awn; lemmas bearded at the base, 4.5-5 mm. long, lateral lobes simple, lanceolate and awned, or irregularly toothed on the inner margins, or rarely with a small tooth at the base inside; awn scabrid up to 1 cm. long; side awns short, 3-nerved; palea 3.5 mm. long, 2-nerved, broadly oblong. *Anthers* 3, 1.3 mm. long, linear.

Common in the beds of hill rivers up to 3,000 ft. Also in the KHASI, JAINTIA and NAGA HILLS at 6,000 ft.

2. *Tripogon jacquemontii* Stapf in Kew Bull. (1892) 85.

Perennial. *Culms* erect, tufted, slender, 16-30 cm. high, smooth and glabrous. *Leaves* mostly basal, filiform, convolute, setaceous, 5-16 cm. long; sheaths loose, papery; ligule short.

Spikes terminal, solitary, slender; spikelets narrowly oblong, secund, appressed or finally spreading, up to 1 cm. long. *Lower glume* lanceolate, 2.5 mm. long, membranous,

1-nerved, lobed on one side, the nerve being produced into a short arista; upper glume ovate-lanceolate, membranous, 4 mm. long, 1-nerved; lemmas 4 mm. long, shortly bearded at the base, 3-nerved, broadly ovate; side lobes not awned but may be lacerate; awn about half as long as the lemma; rhachilla rather flexuous, spikelets spaced; palea broad, truncate; keels scaberulous. *Caryopsis* narrowly oblong, terete, glabrous.

There are no specimens from ASSAM at Kew, but as the grass has been collected in BENGAL, close to the boundary, it will doubtless be found also in ASSAM.

3. *Tripogon filiformis* Nees ex Steud. Syn. Pl. Glum. (1854) 301.

A densely tufted perennial. *Culms* slender, up to 15 cm. high, smooth and glabrous. *Leaf-blades* convolute, filiform, setaceous, smooth and glabrous except for a few hairs at the base, as long as the stem; sheaths papery, persistent; ligule minute.

Inflorescence a simple spike, of many spikelets which are usually secund on the simple rhachis. *Lower glume* lanceolate, 2.5 mm. long, lobed on one side, membranous, 1-nerved; upper glume narrowly lanceolate, membranous, 1-nerved, 4.5 mm. long, nerve produced into a short arista. *Lemmas* 3.5 mm. long, awn 7.8 mm. long, the lemma is 3-nerved, the side nerves are both carried out into short awns and between those two awns and the central awn are two small hyaline lanceolate lobes which are possibly the only distinguishing feature between this species and *T. trifidus*.

NAGA, KHASI and JAINTIA HILLS. Often found on rocks in the hill rivers at the foot of the hills at 500 ft.

Var. *tenuispica* Hook. f. F.B.I. VII (1897) 288.

Bank of the Nanteilek river. NAGA HILLS, 2,000 ft.

9. *NEYRAUDIA* Hook. f.

Spikelets small, 4-8-flowered in an effuse, decompound, nodding panicle, laterally compressed; lowest lemma sometimes glabrous, epaleate and neuter; rhachilla shortly bearded below the lemmas, jointed at the base (above the empty lemma if present) and between the lemmas. *Glumes* and

lemmas membranous; upper and lower glumes unequal, lanceolate, 1-nerved; lemmas elongate-subulate, more or less recurved, ending in a very slender tip with two setaceous points and a scabrid interposed awn, 3-nerved, lateral nerves submarginal, penicillate with long hairs; palea oblong, keels scaberulous. *Lodicules* 2, obovate or cuneate. *Stamens* 3, anthers linear. *Ovary* shortly stipitate, oblong; styles terminal, stigmas feathery. *Grain* linear, terete, loose in the lemma.

Perennial leafy grasses. *Leaves* long, flat.

Neyraudia reynaudiana (Kunth) Keng in Hitchc., Amer. Jour. Bot 21. (1934) 131. Syn. *Arundo reynaudiana* Kunth in Rev. Gram. II. 275; *Neyraudia madagascariensis* Hook. f. var. *zollingeri* Hook. f. F. B. I. VII (1897) 305.

A reed-like, perennial grass up to 4 m. tall. *Clums* thick, terete, smooth and shining. *Leaf-blades* attaining a length of 60 cm., 1-2.5 cm. wide, sometimes narrow and sub-involute, sheaths woolly at the throat and on the collar; ligule fimbriate.

Inflorescence a large nodding panicle, silvery-olive-grey in colour. *Spikelets* 4-8-flowered, the lowest 1 or 2 lemmas empty and resembling the glumes, 6-8 mm. long, rather short-pedicelled along the numerous filiform panicle branches; rhachilla produced, but only bearded below the lowest fertile lemma. *Glumes* sub-equal 2-2.5 mm. long, lanceolate, 1-nerved; empty lemma 3.5 mm. long, awnless, perfectly glabrous, obscurely 3-nerved. *Lemmas* 3-nerved, 4 mm. long, lateral nerves penicillate with long white hairs, more or less recurved, very slender, narrowed into the more or less recurved, not twisted, scabrous awn with two bristles at the base; palea hyaline, 2-toothed, keels minutely ciliolate; callus, the upper portion of each node of the rhachilla, jointed with the latter, densely shortly bearded; awn 1 mm. antrorsely scabrid, recurved.

Common in GOALPARA district.

7. SPOROBOLÆ.

Annual or perennial herbs; leaf-blades narrow; spikelets all alike, hermaphrodite, 1-flowered, small, pedicelled in open or contracted panicles; rhachilla disarticulating above the glumes, very rarely produced beyond the floret; glumes more or less persistent, as long as the floret or more often with the lower or both shorter, nerveless or 1-nerved; lemmas awnless, thinly membranous like the glumes, not changed at maturity, 1- to 3-nerved with the side-nerves when present delicate, frequently olive-grey, usually shining; stamens 1 to 3; grain loose between the lemma and palea, often free in the delicate pericarp.

SPOROBOLUS R. Br.

Spikelets usually very small, variously paniced, not articulated on the pedicels; rhachilla more or less readily disarticulating above the glumes, not produced, or very rarely continued as a bristle. *Floret* one, hermaphrodite. *Glumes* 2, delicately membranous, lower usually smaller and nerveless, upper 1-nerved, falling away one after the other. *Lemma* more or less resembling the upper glume, 1-nerved or more or less distinctly 3-nerved. *Palea* almost as long as the lemma, 2-nerved, folded between the nerves, often split by the developing grain. *Lodicules* 2, broadly cuneate, glabrous, thin. *Stamens* 3, rarely 2. *Ovary* glabrous; styles short, distinct terminal; stigmas plumose. *Caryopsis* free, falling out or retained and dehiscing; pericarp thin, usually swelling in water, rigid, dehiscing or the inner layers mucilaginous when wetted and adherent, or the whole pericarp adnate and indistinct; hilum small, punctiform, basal; embryo rather large.

Perennial, rarely annual grasses, with flat or convolute leaves.

Key to the species of *Sporobolus*.

Glumes shorter than the lemma; perennials.

Branches of the panicle bare at the base. .. 1. *S. diander*.

Branches of the panicle spiculate to the base. 2. *S. indicus*.
Lower glume shorter than upper glume and
lemma; annuals or perennials.

Panicle spike-like :—

Annual	..	..	..	3. <i>S. piliferus</i> .
Perennial	..	..	..	4. <i>S. tremulus</i> .
Panicle loose.	..	..	..	5. <i>S. coromandelianus</i> .

1. *Sporobolus diander* Beauv. Ess. Agrost. (1812) 25.

A slender, perennial grass with tufted stems. *Culms* 25-80 cm. high, smooth and glabrous. *Leaves* very narrow, up to 25 cm. long, 2-3 mm. wide, glabrous with entire margins, usually flat, gradually tapering to a point, sometimes convolute; sheaths smooth, ribbed, the lower short, the upper long; ligule a line of hairs.

Inflorescence a pyramidal panicle, with spreading (always when mature) or sub-erect, solitary or fascicled branches, somewhat flexuous, often without spikelets at the base. *Spikelets* minute, spindle-shaped, 1.5 mm. long or less. *Lower glume* ovate-truncate, nerveless, less than .5 mm. long; upper glume ovate-lanceolate, (not truncate), sometimes erose, up to 1 mm. long, nerveless; lemma 1.5 mm. long, ovate, obscurely 1-nerved; palea equally long. *Lodicules* 2. *Stamens* 2 or 3. *Ovary* less than .5 mm. long, glabrous; stigmas spreading, plumose. *Grain* subtruncate, pericarp somewhat adherent.

Very common throughout the province; from the plains up to 7,000 ft.

2. *Sporobolus indicus* R. Br. Prod. (1810) 170.

Culms 50-120 cm. tall, tufted, rather slender, erect, glabrous and smooth throughout except where noted; the filiform leaves at the base often as long as the plant. *Leaf-blades* 15-50 cm. long, 1.5-3 mm. wide, flat at the base or involute towards the long-attenuate filiform tip, especially those at the base and on sterile shoots; sheaths longer than the internodes, the junction with the blade often very obscure, often with a small tuft of hairs at the throat; ligule a line of very short hairs.

Inflorescence a panicle 6-40 cm. long, included at the base or long-exserted, sub-cylindric, 3-6 mm. wide, pale green in colour (often dark owing to fungus attack) the branches commonly less than 2.5 cm. long, erect or appressed; the spikelets crowded on one side of the branch or branchlets. *Spikelets* 1.5-2 mm. long, pale green, seated on short pedicels shorter than the spikelets. *Glumes* unequal, minutely rfringed, nerveless or the upper 1-nerved, thin, the lower $\frac{1}{3}$ the length of the spikelet, the upper twice as long as the lower. *Lemma* slightly longer than the broad, obtuse palea, both thin and hyaline. *Caryopsis* soon falling from the lemma and palea, reddish, often adhering to the panicle by the viscid pericarp, a ripe panicle being often dotted with the small, dark reddish grains.

A very common grass all over the province, ascending in the hills to 5,000 ft.

2a. *Sporobolus poirettii* (Roem. et Schult.) Hitch.
Bartonia XIV (1932) 32.

A perennial grass. *Culms* 60-90 cm. tall, densely caespitose, stout, with long internodes and glabrous nodes. *Leaves* crowded near the base of the culms, 30-60 cm. long, very slender, wiry flexuous, convolute (rarely flat), with long filiform tips, quite smooth; sheaths smooth, ribbed; ligule a ridge of minute hairs.

Inflorescence a panicle up to 45 cm. long by 20 mm. wide, often interrupted; branches very short, erect, densely crowded on a smooth slender rhachis, densely spiculate to the base with imbricate green spikelets. *Spikelets* 2.2-5 mm. long, seated on very short pedicels. *Lower glume* broadly oblong, nerveless, hyaline, .5 mm. long; upper glume oblong, hyaline, nerveless, 1 mm. long. *Lemma* as long as the spikelet, broadly ovate, 1-nerved; palea medially plicate. *Stamens* 3. *Grain* 1.2 mm. long, obovoid, quadrangular, truncate, red-brown, rugulose, enclosed in the loose pericarp.

A common grass up to 5,000 ft.

Some of the Assam specimens are extremely like this grass. As Hitchcock remarks (*Grasses of the United States*, 1935) this species has been referred to the Australian grass *S. elongatus* R. Br. which

seems to be distinct and different in its looser panicle. The same author states with regard to *S. indicus* R. Br., the species of the Flora of British India, that the two are very similar, but the latter has more slender blades especially at the base. and the panicle branches are longer, more slender, less densely flowered, loosely ascending to somewhat spreading, and the panicle is not spikelike. As far as the Assam specimens are concerned there is great variance in the panicle but on the whole they are spikelike.

3. *Sporobolus piliferus* Kunth, Enum. Pl. I (1838) 211.

A densely tufted annual grass. *Culms* erect, often from a geniculate base, 5-35 cm. long. *Leaves* flat, sparsely hairy, gradually tapering to the tip, sometimes convolute, margins of the blades serrulate near the base and sometimes as far as the tip; ligule a ring of dense hairs.

Inflorescence a linear, narrow, strict, dense-flowered, often interrupted panicle, 3-9 cm. long. *Lower glume* lanceolate-truncate 5 mm. long, nerveless; upper glume lanceolate, 1.75 mm. long, slightly shorter than the upper glume, ovate-lanceolate, 1-nerved; palea narrowly oblong, as long as the lemma truncate. *Lodicules* 2. *Stamens* usually 2. *Caryopsis* 1 mm. long, brown, ovate, apiculate at the upper end.

Common in the hills, 4-6,000 ft.

4. *Sporobolus tremulus* Kunth. Rev. Gram. I (1829) 67.

A perennial grass erect or prostrate from a hard, knotted, stoloniferous rootstock; stolons 15-45 cm. long, stout or slender, leafy, flexuous. *Culms* 2.5-20 cm. long, wiry, smooth and glabrous. *Leaf-blades* short, 1-5 cm. long, often rigid, tapering to a sharp, pungent point, hairy at the base, flat or convolute; sheaths striate, glabrous; ligule a ring of hairs.

Inflorescence a narrow, sub-spiciform panicle, 2.5-12 cm. long, often included in the uppermost leaf-sheath, branches erect, very rarely a few spreading, sometimes flexuous. Spikelets aggregated, dense, seated on very short pedicels, pale green or white in colour, 1.5-2.5 mm. long. *Lower glume*

hyaline, 1-nerved, lanceolate, about 1.1-1.6 mm. long; upper glume 1.5-2.5 mm. long, lanceolate, a little broader than the lower, 1-nerved; lemma 1.5-2.5 mm. long, 1-nerved, similar to the upper glume, subtruncate; palea as long. *Stamens* 3. *Grain* broadly oblong, laterally compressed, rounded at both ends, covered with the debris of the pericarp, very smooth, yellowish brown.

There is one sheet of this grass at Kew, labelled ASSAM. It has not been collected since.

5. *Sporobolus coromandelianus* (Retz.) Kunth,
Rev. Gram. I (1829) 68.

A densely tufted annual with many leafy stems spreading from the root. *Leaf-blades* 2.5-7.5 cm. long flat, tapering from a .5 mm. wide base gradually to the fine tip, spinulose-toothed on the margins; base somewhat cordate; lower sheaths short, terete or compressed, the upper long, hairy at the mouth; ligule a short membranous ridge, lacerate, with fine close-set hairs.

Inflorescence usually a short, dense pyramidal panicle, occasionally loose and spreading; branches capillary in rather distant whorls of 3-6, horizontally spreading, upper branches sometimes alternate or fascicled, naked below, sparingly shortly divided upwards; peduncle glandular above the lowest whorl. Spikelets minute, scarcely 1.25 mm. long, seated on short pedicels. *Lower glume* less than .5 mm. long, nerveless; upper glume ovate-lanceolate, 1.25 mm. long, 1-nerved. *Lemma* ovate-lanceolate, not so broad as the glume and a little shorter. *Lodicules* 2. *Stamens* 3. *Caryopsis* up to .5 mm. long, cylindrical.

Not recorded from ASSAM so far; it will, however, most certainly be found in the plains of SYLHET, GOALPARA and DARRANG.

8. CHLORIDEÆ.

Spikelets usually laterally compressed, 1- to few- flowered with the floret hermaphrodite and with or without imperfect florets above or below it, sessile or sub-sessile in one or two rows on one side of the continuous (rarely jointed) rhachis of solitary, digitate or scattered spikes or spike-like racemes, or in a fascicle of few spikelets; rhachilla disarticulating above the glumes, rarely below them; glumes usually persistent; lemmas membranous to chartaceous, entire, emarginate or 2- to 4- lobed, awnless or awned 1- to 3-nerved with the lateral nerves near the margins and often ciliate; lodicules 2, rarely suppressed; stamens usually 3; caryopsis enclosed in the scarcely changed lemma and palea.

Annual or perennial herbs; leaf-blades narrow.

Key to the genera of *Chlorideæ*.

Spikelets awned.	..	..	..	1. Chloris.
Spikelets unawned :—				
Spikes digitate.	..	..	..	2. Cynodon.
Spike solitary.	..	..	..	3. Microchloa.

1. CHLORIS Sw.

Spikelets of 2-4 florets, sessile, crowded, unilateral, 2-seriate on a slender rhachis; rhachilla disarticulating above the glumes, tough between the lemmas, more or less produced; lowest floret hermaphrodite, the 2nd male or barren, the following if present barren, often minute. *Glumes* 2, persistent, narrow keeled, acute and mucronate, very thin, or broad, and the upper obtuse, more or less bilobed and rounded on the back. Hermaphrodite floret; lemma narrow or broad, 3-nerved, acute or obtuse, minutely 2-toothed, usually awned from below the apex, often ciliate; palea almost equalling the lemma in length, 2-keeled; lodicules 2, minute, delicate, glabrous; stamens 3; ovary glabrous, styles distinct, short; stigmas laterally exerted. Male floret; lemma and palea as in the hermaphrodite floret but smaller

and glabrous. Rudimentary florets glabrous, awned or awnless, small to very small, usually without a trace of a palea. *Caryopsis* oblong; triquetrous; embryo rather large, hilum punctiform, basal.

Perennial, rarely annual, erect or decumbent herbs; leaves usually flat, sometimes complicate or convolute.

It is not unlikely that *C. delicatula* C.B.C. may be found in the Naga Hills as it occurs in Upper Burma; also *C. polystachya* Roxb., found in Bengal, may occur in Lower Assam.

Key to the species of *Chloris*.

Empty lemmas above the floret solitary, well developed or rudimentary.

Empty lemma represented by a fine arista. 1. *C. incompleta*.

Empty lemma oblanceolate, truncate. .. 2. *C. virgata*.

Empty lemmas above the floret 2 or 3 :—

Spikelets 3 mm. long. .. 3.. *C. gayana*.

Spikelets 2.5 mm. long. . .. 4. *C. barbata*.

1. *Choris incompleta* Roth. Nov. Sp. (1821) 60.

A perennial grass. *Culms* usually erect but sometimes procumbent, stout or slender, 15 cm. to 1 m. tall. *Leaf-blades* 10-25 cm. long, 4-6 mm. broad, flat, linear, terminating in a fine point, glabrous except for a few hairs near the mouth of the sheath, scabrid; sheaths glabrous, striate, sometimes with a fringe of hairs along the outer margin; mouth hairy; ligule a palisade of long hairs.

Inflorescence consisting of 4-10 digitate, slender, spreading spikes of awned florets; rhachis scabrid. *Lower glume* linear-lanceolate, acute, 2-2.5 mm. long, 1-nerved, scabrid on the keel; upper glume lanceolate, membranous, 5-6 mm. long, 1-nerved, 2-toothed at the apex, with the nerve produced between the teeth into a short awn 1-2 mm. long, scabrid on the keel. *Lemma* oblong-lanceolate, 5-5.5 mm. long, scabrid on the back and margins, 2-toothed at the apex, awned with a median scabrid awn up to 9 mm. long; callus bearded; palea hardly as long as the lemma, oblong, acute or truncate at the apex, scaberulous on the keels; rhachilla produced, awnlike and scabrid, bearing either a rudimentary,

awned floret or its position indicated by a thickening at the apex; anthers small: grain free within the lemma and palea.

Plains of SYLHET and lower foothills of the KHASI HILLS.

2. *Chloris virgata* Sw. Flor. Ind. Occ. I. (1797) 203.

A perennial grass with stout, somewhat flattened stems 15-50 cm. long, sometimes creeping and rooting at the nodes below, finally erect. *Leaves* flat, glabrous, hairy near the throat, 5-25 cm. long, up to 4 mm. broad, tapering gradually to an acute tip; sheaths somewhat loose, smooth and glabrous; ligule a narrow, truncate, membranous appendage.

Inflorescence consists of 4-9 spikes, 2.5-3.5 cm. long, digitately arranged; when young the inflorescence is enclosed in the topmost leaf sheath; rhachis capillary, angled, scabrid. *Spikelets* 3-4 mm. long, arranged in two rows, shortly stalked. *Lower glume* 2 mm. long, 1-nerved, scabrid on the keel; *upper glume* 3-4 mm. long, oblong-lanceolate in shape, keeled, 1-nerved, scabrid on the keel, glabrous, 2-fid at the apex, with the nerve produced into a short scabrid awn. *Lemma* 2.5-3.5 mm. long, oblong lanceolate, bifid at the apex with the nerve produced as a scabrid awn up to 7 mm. long, bearded at the base, long ciliate on the margins in the upper half almost to the tip, sparingly ciliate in the lower half, grooved on both sides of the dorsal nerve and covered with short appressed hairs: rhachilla produced carrying a well-developed or rudimentary, second lemma: palea oblong-lanceolate, minutely 2-toothed at the apex. *Stamens* 3. *Lodicules* 2. *Caryopsis* shining, trigonous, 1.5 mm. long.

Reported from ASSAM by Jenkins; no locality given.

3. *Chloris gayana* Kunth, Rev. Gram. I 89, 293, t. 58.

A perennial or annual grass, 60-120 cm. tall. *Culms* erect, geniculately ascending or prostrate at the base, simple or branched, often emitting fascicles of barren shoots or short runners from the lower nodes, often robust, 3-9-noded, compressed below, glabrous, smooth, upper internodes usually

exserted; sheaths glabrous or sparingly hairy near the mouth, smooth, the lower strongly compressed, keeled, keels sometimes scabrid, the uppermost sometimes tumid; ligules very short, membranous, long hairy; blades linear, long-tapering to a fine point, 15 to more than 30 cm. long, by 7-10 mm. broad when expanded, flat or folded, glabrous or hirsute near the base, green, smooth below, rough above and on the margins.

Inflorescence consisting of 6-15 spikes, umbelled, sessile, sub-erect, rarely preading, 5-8 cm. long, greenish or brownish; rhachis scabrid. *Spikelets* 3 mm. long, 3-4 flowered, shortly 2-awned, glumes very unequal; the lower ovate-lanceolate, acute, sub-hyaline, 1-1.5 mm. long; the upper oblong, obtuse, mucronate 2-3 mm. long, firmer, scaberulous. *Lowest floret* hermaphrodite; lemma oblong, sub-obtuse or acute, minutely 2-toothed, ciliolate along the marginal nerves and shortly bearded below the tip or almost glabrous, with a (sometimes minutely hairy) groove on each face; awn as long as, or slightly longer than the lemma, straight; callus minutely bearded; palea glabrous, keels scabrid; anthers 1.5 mm. long. *Upper floret* barren, like the lower, but glabrous, 2 mm. long; awn 2 mm. long or less. *Third* (and fourth) lemma rudimentary, cuneate in profile, empty, awnless.

Introduced as a fodder grass.

4. *Chloris barbata* Sw. Flor. Ind. Occ. I (1797) 200.

A perennial grass. *Culms* stout from a geniculate base, 30-100 cm. tall, simple or branched, rooting at the nodes below; nodes often bearing large tufts of leaves having compressed, equitant sheaths. *Leaf-blades* flat, sometimes folded, 5-50 cm. long, up to 5 mm. wide, linear, tapering to an acute point, with a few long hairs near the base, otherwise glabrous; sheaths compressed, rather loose, glabrous with a tuft of hairs at the mouth; ligule a narrow membranous ridge.

Inflorescence consists of 5-15 digitately arranged spikes of spikelets in rows on one side of an angled, scabrid rhachis. *Spikelets* usually purplish in colour, up to 2.5 mm.

long. *Lower glume* strongly keeled, scabrid on the keel, 1.75 mm. long, lanceolate-acute, 1-nerved; *upper glume* 2.25 mm. long, 1-nerved, keeled, scabrid on the keel, otherwise membranous, ending in a very short awn. *Lemma* broadly ovate, 2 mm. long, 3-nerved, densely bearded on both sides of the upper half of the margins; awn 6 mm. long, scabrid; *palea* oblanceolate, 2 mm. long. The *rhachilla* is produced, 1 mm. long, and seated upon it are two empty lemmas, the lower cuneiform in shape, 3-nerved, awned from the back, ciliate above the middle, the upper shortly awned, 3-nerved glabrous and globose. *Stamens* 3. *Lodicules* 2. *Caryopsis* 1.75 mm. long.

Plains of the SURMA VALLEY.

2. *CYNODON* Rich.

Spikelets all alike, laterally compressed, alternately 2-seriate, imbricate, not jointed at the base, 1-flowered, secund on a slender rhachis of which 2-8 are fascicled or umbelled to form the inflorescence; rhachilla jointed above the glumes, produced or not. *Glumes* sub-equal, thin, keeled, acute or mucronate, persistent or separately deciduous. *Lemma* broader than the glumes, firmly membranous, boat-shaped. 3-nerved, keel ciliate, awnless; *paleas* 2-keeled, containing a bisexual floret. *Lodicules* 2, minute. *Stamens* 3. *Styles* 2, free. *Grain* oblong, free within the lemma and palea.

Creeping perennial grasses with erect culms and narrow flat, or complicate leaves.

Cynodon dactylon Pers. Syn. I (1805) 85.

A perennial grass extensively creeping by scaly rhizomes or by strong flat stolons. *Culms* up to 30 cm. tall, slender, glabrous smooth. *Leaves* conspicuously distichous on the barren shoots and at the lower part of the culms; blades linear, finely acute, 2-15 cm. long, up to 3 mm. wide, rigid or flaccid, folded, convolute or flat, more or less glaucous, glabrous or hairy, smooth on the lower surface, scaberulous above; sheaths smooth; ligule a conspicuous ring of white hairs.

Inflorescence of 4-5 fascicled spikes 1.5-5 cm. long;

rhachis pubescent at the base, keel and margins scabrid, or the margins smooth. *Spikelets* light green or purplish in colour, 2.2-8 mm. long. *Glumes* lanceolate, acute to subulate-mucronate, the lower 1.25-1.8 mm. long, the upper usually longer, keels scabrid or smooth. *Lemma* firm, obliquely oblong to semi-ovate, sub-obtuse or minutely apiculate, about 2.5 mm. long, ciliate on the keel; keels of palea scaberulous: rhachilla often prolonged beyond the palea as a slender naked bristle, sometimes bearing a rudimentary lemma. *Anthers* oblong, 1.25 mm. long. *Grain* 1.25 mm. long.

Very common in plains and hills, ascending to 6,000 ft. An excellent fodder grass of which the seed can be eaten in times of want. Often gregarious on lightly trodden paths. Extensively used as a lawn grass in the humid climate of ASSAM.

3. *MICROCHLOA* R. Br.

Spikelets very narrow, minute, 1-flowered, 2-seriate and secund on a solitary, terminal, filiform somewhat curved rhachis, not jointed at the base. *Glumes* subequal, membranous, 1-nerved, persistent, linear-lanceolate in shape, acute; lemma on a very short rhachilla which is not produced and is jointed just above the glumes, hyaline, very small, oblong, 2-nerved; palea as long, 2-keeled, keels ciliate. *Lodicules* 2, truncate. *Stamens* 3; anthers linear. *Styles* distinct. *Caryopsis* oblong-fusiform, glabrous, free within the lemma and palea.

Slender perennial grasses with filiform convolute leaves.

Microchloa indica Beauv. Agrost. (1812). Syn. *M. setacea* Br. Prod. I (1810) 208.

A tufted perennial grass (often annual). *Culms* very slender, terete, smooth and glabrous, usually unbranched, shining. *Leaves* crowded at the base; blades filiform, sub-setaceous tapering to a fine point, up to 15 cm. long, curved glabrous or very sparsely hairy; sheaths tight, shorter than the internodes, smooth and glabrous, striate; ligule a narrow, ciliate rim.

Inflorescence a slender, dorsally rounded, solitary, terminal, filiform, curved spike, 5-25 cm. long, upon which is arranged a second biseriate row of spikelets. *Spikelets* 3 mm.

long; rhachilla jointed above the glumes and not produced. *Lower glume* and upper glume equal, lanceolate in shape, 1-nerved, keeled, persistent, 2.5 mm. long. *Lemma* ovate, 1.5 mm. long, densely hairy on the back; palea narrower than the lemma, hairy on the nerves, 2-toothed at the apex. *Stamens* 3; anthers 1 mm. long. *Lodicules* 2. *Grain* oblong, fusiform, slightly compressed, glabrous, 1.25 mm. long.

A common grass in the hills about 4,000 ft. It is often gregarious on bare areas, particularly in road cuttings.

9. AVENEÆ.

Annual or perennial herbs; leaf-blades narrow, spikelets all alike 2-7-(rarely 1-) flowered, with all the florets hermaphrodite or the uppermost often barren, or in 2-flowered spikelets rarely with the upper floret male, pedicelled in open or contracted panicles, rarely in racemes or spikes; rhachilla disarticulating above the glumes and usually between the florets; glumes persistent, rarely deciduous, mostly similar, usually as long as the lowest lemma and often as long as the spikelet enclosing the florets, membranous to chartaceous, frequently with shining margins; lemmas membranous to cartilaginous, their margins often hyaline or scarious and shining, 5- or more- (rarely 3-) nerved, awnless or more often awned from the back or from the sinus of the 2-lobed tip, the awn usually geniculate and twisted below the knee: lodicules 2; stamens 3.

Key to the genera of *Aveneæ*.

- | | |
|--|---------------------------|
| Lowest floret male. | 1. Arrhenatherum. |
| Lowest floret hermaphrodite. | |
| Lemmas awned from the back. | |
| Awn placed more than $\frac{1}{3}$ length of lemma below the tip. Ovary hairy. | |
| Spikelets nodding: glumes 7-9-nerved. . . | 2. Avena. |
| Spikelets upright; glumes 1-5-nerved. . . | 3. Helictotrichon. |
| Awn placed just below the tip. Ovary glabrous. | |
| Glumes persistent. | 4. Trisetum. |
| Glumes deciduous with spikelet. | 5. Holcus. |
| Lemmas awned from the sinus. | 6. Danthonia. |

1. **ARRHENATHERUM** Beauv.

Spikelets 2-flowered, the lower floret male, the upper hermaphrodite; rhachilla disarticulating above the glumes and produce beyond the uppermost floret; glumes rather broad and papery, the lower 1-nerved the upper a little longer than the lower, 3-nerved; lemmas 5-nerved, hairy on

the callus, the lower bearing near the base, a twisted, exserted, geniculate awn, the upper bearing a short, straight, slender awn just below the tip.

Rather tall perennial grasses with flat blades and narrow panicles.

Arrhenatherum elatius (L.) Presl., Fl. Cech. (1819)

17. Syn. *Avena elatior* Linn. Sp. Pl. (1753) 79.

An erect grass from an extensively creeping rootstock. *Culm* 1-1.5 m. tall. *Leaves* flat, broadly linear-lanceolate, scabrous, 20 cm. long, 5-10 mm. wide; ligule short, toothed.

Inflorescence a panicle, 15-30 cm. long, pale or purplish, shining; the short branches verticillate, spreading in anthesis, usually spiculate to the base. *Spikelets* 7-8 mm. long, 2-flowered; glumes minutely scabrous; lemmas scabrous; the awn of the staminate floret about twice as long as its lemma.

Introduced into Shillong.

2. AVENA Linn.

Spikelets large or very large, 1.7-4 cm. long, pendulous in open, usually very lax panicles; rhachilla hairy or glabrous, disarticulating above the glumes and between the lemmas, or only above the glumes, or not at all in cultivated forms, usually terminated by a rudimentary lemma. *Florets* 3-5; the lower 1 or 2 (rarely 3) hermaphrodite; the upper reduced, smaller, male or barren or quite rudimentary. *Glumes* 2, persistent, scarious, equal or sub-equal, acute or acuminate, rounded on the back, 7-11-nerved. *Lemmas* distinctly shorter or just equalling the glumes, sub-herbaceous with rather rigid scarious tips, acute or acuminate, bifid, with or without bristles from the lobes, 5-9-nerved, lower 1-3 awned; awn dorsal from the middle or slightly above it, kneed and twisted below or (in the upper lemmas) imperfect; callus short, villous (or imperfect and glabrous in cultivated forms). *Palea* shorter than the lemma, 2-keeled, 2-toothed or bifid. *Lodicules* 2, rather large, hyaline, entire. *Stamens* 3. *Ovary* densely villous from the base; style distinct, extremely short or absent; stigmas laterally exserted, plumose. *Grain* oblong,

sub-terete, grooved in front, hairy, pallid, enclosed by the lemma and palea; hilum fine, linear oblong; embryo small.

Annual grasses with linear flat, flaccid blades.

Key to the species of *Avena*.

Spikelets mostly 2-flowered; lemmas glabrous. 1. *A. sativa*.

Spikelets mostly 3-flowered; lemmas hairy. .. 2. *A. fatua*.

1. *Avena sativa* Linn. Sp. Pl. (1753) 79.

Culms simple; leaf sheaths glabrous; ligules shortly ovate 3.5-6 mm. long; blades linear or lanceolate-linear, glabrous, scaberulous.

Panicles open; branches spreading equally all round or contracted and secund; spikelets 22-30 mm. long or longer, usually with a 1-awned floret at the base and one or two awnless florets above or with all the florets awnless; rhachilla tough or tardily disarticulating at the base, glabrous or almost so; glumes broad lanceolate 7-11-nerved; lemmas lanceolate, acuminate, shortly bifid or 2-4-toothed, glabrous, rarely with a few scattered hairs, the lower 17-25 mm. long; ovary hairy all over; grain tightly enclosed by the lemma and palea, free, silky all over.

Cultivated in the BALIPARA FRONTIER TRACT.

2. *Avena fatua* Linn. Sp. Pl. (1753) 80.

Culms solitary or few in a tuft, with few or no barren shoots; leaf-sheaths glabrous or the lower more or less hairy; ligules short, very obtuse up to 3.5 mm.; blades linear to lanceolate-linear, up to 30 cm. long by 1.5 cm. broad, glabrous or rarely sparsely hairy, scabrid.

Panicle open or contracted; branches spreading equally all round or more or less erect and sub-sekund; spikelets 2.2-2.8 cm. long, with 2-3-awned florets and with or without a rudimentary, usually minute, awnless floret above them; rhachilla freely disarticulating below and more or less so between the lemmas; joints between the lemmas villous; glumes broad, lanceolate, acuminate, 7-9-nerved; lemmas lanceolate, acute, shortly 2-4-toothed; the lower 15-22.5 mm. long, usually brown below and green towards the tip, scabe-

rulous, with stiff brown hairs to the middle or sub-glabrous with the exception of the very short callus, 7-nerved, all awned except the rudimentary uppermost; awn from the middle, scabrid; column very dark, 10-17 mm. long; bristle 1.8-3.5 cm. long; anthers 2.5-3.5 mm. long; ovary villous all over; grain 7.5-10 mm. long, tightly embraced, free, silky all over.

Introduced into Shillong in grass seed of Mediterranean origin.

3. HELICTOTRICHON Bess ex Schult.

Spikelets narrowly oblong to oblong or elliptic-oblong, laterally compressed, erect or sub-erect, less often nodding, moderately large, pedicelled in open or contracted panicles; rhachilla slender, more or less long hairy, disarticulating above the glumes and between the florets, produced into a short bristle beyond the uppermost floret or ending a rudimentary lemma. *Florets* 2-6, hermaphrodite or the uppermost more or less reduced; callus short or elongated, villous. *Glumes* persistent, hyaline to scarious, or herbaceous and firm, more or less equal, acute or acuminate, more or less distinctly keeled; lower smaller, 1-3-nerved; upper 3-5 (rarely sub-7-) nerved. *Lemmas* narrowly lanceolate to lanceolate-oblong and acute in profile, enclosed by, or more often distinctly exserted from the glumes, more or less herbaceous, with hyaline tips and margins or becoming indurated, bifid, with or without bristles from the lobes, 5-11-nerved, awned from the middle or above the middle of the back; awn usually geniculate and twisted below the bend. *Paleas* oblong linear, shorter than the lemmas, 2-keeled, membranous. *Lodicules* 2, rather large hyaline. *Stamens* 3. *Ovary* hairy from the middle upwards or only at the top; styles distinct, short; stigmas plumose, laterally exserted. *Caryopsis* oblong, slightly laterally compressed, usually grooved in front, hairy at the top, rather soft, embraced by the lemma and palea; hilum linear, up to half the length of the grain; embryo small.

Caespitose perennials; leaf-blades linear, usually narrow, flat or convolute, rarely folded, sometimes setaceous; ligule hyaline; panicle narrow, erect or nodding.

Helictotrichon asperum (Munro) Bor, in Ind. For. Rec. (Bot.) 1.3 (1938) 68. Syn. *Avena aspera* Munro ex Thwaites, Enum. Pl. Zeyl. (1864) 372. *Avenastrum asperum* Fischer, Flora of Madras, X (1931) 1802.

A perennial grass, 60 cm.-1.5 m. tall, slender or sometimes stout glabrous or smooth. *Leaf-blades* 15-30 cm. long, flat or rarely convolute, up to 1 cm. wide; sheaths smooth and glabrous or sometimes pubescent; ligules short, truncate, membranous.

Inflorescence a panicle, often nodding; main axis and branches more or less scabrid; lower branches up to 15 cm. long, solitary, geminate or fascicled. *Spikelets* 8 to 15 mm. long, ovate or ovate-oblong in outline, green and glistening. *Lower glume* 7 mm. long, lanceolate, 1- to 3-nerved; tip acute; keel strongly scabrid below the tip. *Upper glume* 9.5 mm. long, ovate-lanceolate, acute, scaberulous near the tip, 5-nerved. *Lowest lemma* 11 mm. long, ovate-lanceolate, callus hairy, dorsal surface scaberulous, with short, distant hairs along the margins, ovate-lanceolate, 7-nerved, the central nerve being continued out into a strongly kneed awn which arises from the dorsal surface, the next two nerves are produced upwards into 2 aristae; awn 2-5 cm. long, often recurved, scaberulous; upper lemmas consecutively smaller and not showing prominent aristae; palea 8 mm. long; tip obtuse, 2-keeled, pectinately ciliate on the keels. *Anthers* linear 2.5-3.25 mm. long. *Ovary* ovoid or pyriform, densely hirsute on tip. *Lodicules* 2-cleft.

Common in the NAGA, AKA, KHASI and JAINTIA HILLS. 4-6,000 ft.

4. TRISETUM Pers.

Spikelets rather small, 2.5-10 mm. long, usually in close, often spike-like panicles; rachilla ciliate or long hairy, very rarely glabrous; disarticulating above the glumes and between the lemmas, produced into a short bristle beyond the uppermost floret. *Florets* two to six, hermaphrodite, or the uppermost more or less reduced. *Glumes* two, persistent, equal or more or less unequal, acute, keeled, lower 1-(or like the upper more or less distinctly 3-) nerved, hyaline.

Lemmas equalling or exceeding the glumes, membranous with hyaline tips and broad margins, acutely 2-toothed, sometimes with fine short bristles from the teeth, faintly or obscurely 5-3-nerved, awned; awn from the back near the tip, fine, straight, or kneed and twisted below; callus minute, more or less hairy or glabrous. *Palea* shorter than the lemma, 2-keeled, 2-toothed, hyaline. *Stamens* 3. *Ovary* glabrous; styles distinct, very short; stigmas laterally exerted, plumose. *Grain* oblong, whitish, soft, embraced by the usually slightly hardened back of the lemma; hilum basal, short; embryo small.

Trisetum flavescens (L.) Beauv. Ess. Agrost. (1812) 88. 153.

A tufted perennial with numerous fibrous roots which are often of a yellowish colour. *Culms* erect, striate, terete, often from a shortly decumbent base, up to 60 cm. tall, smooth and glabrous. *Leaf-blades* rather thin, linear, tapering to a fine point, often abruptly rounded at the base to the sheath, sparsely to thickly villous on both surfaces, smooth; blades 4-10 cm. long, 3-5 mm. wide; sheaths rather loose, striate, smooth and glabrous or densely covered with silky, reflexed villae; ligule short, blunt, membranous.

Inflorescence a symmetrical, open or contracted, erect panicle, golden yellow in hue; branches whorled on an erect central axis; axis striate, smooth and glabrous; branches swollen at the insertion, flexuous, capillary, naked at the base. *Spikelets* small, numerous, 2-3-flowered. *Lower glume* subulate, keeled, hyaline on the margins, 1-nerved; upper glume broadly ovate-acuminate, 4.5-5 mm. long, 3-nerved, margins hyaline, keeled. *Lemmas* ovate-lanceolate, 5.5 mm. long or less, 5-nerved, lateral nerves often indistinct, bifid at the apex, with a geniculate awn, 6 mm. long, from the dorsal surface 1/4 to 1/3 the length of the lemma from the tip, margins and tip hyaline, stamens 3, anthers 2.25 mm. long. *Rhachilla* capillary, bearded, crowned by an imperfect lemma which often bears an awn of normal length.

Introduced in fodder grass seed into Shillong (4,700 ft.) and run wild in the station.

5. **HOLCUS** Linn.

Spikelets in rather dense, oblong or interrupted panicles, laterally compressed, disarticulating from the tips of the pedicels; rhachilla slightly produced beyond the upper floret, disarticulating more or less readily below the lemmas; joints slender, lower curved and often appendaged.

Florets two; lower hermaphrodite; upper usually male, sometimes hermaphrodite or barren. *Glumes* two, membranous, keeled, acute or acuminate; lower 1-nerved; upper 3-nerved, sometimes awned. *Lemmas* shorter than the glumes, chartaceous, very obscurely 3-5-nerved; lower awnless; upper awned. *Palea* narrow, 2-keeled. *Lodicules* 2, delicate. *Stamens* 3. *Ovary* glabrous, styles distinct; stigmas plumose, laterally exserted. *Grain* laterally compressed, enclosed by the lemma and palea, and often adhering to the latter, soft; hilum short; embryo small.

Key to the species of *Holcus*.

- Glumes 4-5 mm. long. awn finely serrated
towards the point; rhizome absent. .. 1. *H. lanatus*.
Glumes nearly 5-6 mm. long; awn serrated
throughout its length; rhizomes present. .. 2. *H. mollis*.

1. ***Holcus lanatus* Linn. Sp. Pl. (1753) 1048.**

A perennial, tufted grass, 60-90 cm. tall; culms 3-4-noded, softly hairy at least below the panicle, rarely quite glabrous, villous at the nodes; the uppermost sheaths inflated; ligule membranous, oblong, pubescent, 2-5 mm. long; blades linear to linear-lanceolate, up to 15 cm. long by 5-7-5 mm. wide; the uppermost very short, flat, softly hairy.

Inflorescence a panicle, erect, oblong, 5-15 cm. long, usually contracted; rhachis, branches, branchlets and pedicels hairy; spikelets oblong, 4-5-5 mm. long, whitish or purplish; glumes almost equally long, hairy, mucronate scabrid; keels pectinate-ciliate; the lower narrower; the upper broader with prominent side nerves. *Lower floret* hermaphrodite; upper male; lower lemma obliquely lanceolate-oblong, rather more than 2-5 mm. long, with a few hairs on the keel, very obscurely 5-nerved; callus with a few long hairs; upper lemma smaller and thinner; awn shorter than the

lemma, at length recurved, rather stout, serrate only towards the point; paleas as long as the lemmas; anthers 2-2.5 mm. long.

Introduced with fodder grass seed into Shillong.

2. *Holcus mollis* Linn Syst. Nat. ed. 10.2 : (1759) 1305.

A perennial grass closely related to *H. lanatus* L. The culms are glabrous 50-100 cm. tall with vigorous slender rhizomes; sheaths except the lower glabrous; blades villous or velvety, 4-10 mm. wide; panicle ovate or oblong rather loose, 6-10 cm. long; spikelets 5-6 mm. long, glumes hairy on the nerves; awn of the second floret geniculate exserted, about 3 mm. long, serrated throughout its length.

Introduced into Shillong with grass seed from Europe.

6. DANTHONIA DC.

Spikelets small to large, laterally compressed, pedicelled in open or contracted panicles, rarely in racemes, very rarely sessile or sub-sessile in distichous secund spikes; rhachilla disarticulating above the glumes and between the florets, usually ending in a rudimentary floret. *Florets* 2-10, hermaphrodite, the uppermost (when more than 2) reduced, usually exceeded by the glumes or more or less equalling them; callus small or rather long, obtuse or acute, hairy. *Glumes* persistent, equal or sub-equal, more or less lanceolate in profile, acute or acuminate, keeled, hyaline to scarious or sub-herbaceous, 3-11-nerved. *Lemmas* rounded on the back, firmly membranous to coriaceous, more or less hairy, often with the hairs partly gathered in variously arranged tufts, 5-11-nerved, 2-lobed, awned from the sinus; lobes free, rarely more or less adnate to the awn, acute or obtuse, with or without a bristle from the tip; awn usually geniculate, mostly twisted below the bend. *Paleas* 2-keeled, mostly exceeding the insertion of the awn of the lemma, entire or shortly bifid. *Lodicules* 2, large, or sometimes small, ciliate or glabrous. *Stamens* 3. *Ovary* oblong or obovoid, glabrous; styles distinct, slender, long or short and then sometimes with the stigmatic hairs decurrent on the inner side and joining over

the top of the ovary; stigmas plumose, laterally exserted. *Grain* oblong, obovoid or ellipsoid, dorsally compressed or semi-terete, rarely almost terete; hilum obscure, oblong or linear; embryo one-third to half the length of the grain:—

Caespitose perennials, rarely annuals; ligule a fringe of hairs; blades narrowly linear to linear, or setaceous, rolled or flat; panicle often very dense.

Danthonia cachymeriana *Jaub. et Spach.* Illustr. Pl. Orient. iv. 46.

A caespitose perennial. *Culm* 1 m. tall, smooth and glabrous, erect; base covered with the remains of old sheaths. *Leaves* linear-setaceous, very narrow (2 mm.) and up to 35 cm. long, minutely scaberulous or smooth on the upper surface, lower surface smooth, glabrous; margins cartilaginous and smooth; sheaths smooth and glabrous, striate, rather loose, a few long villae at the throat; ligule a dense ring of short hairs.

Inflorescence a contracted panicle, upper part racemose with spikelets singly pedicelled on the axis, lower branches in pairs and branched. Main axis and pedicels angled, scabrous and villous or hispid on the angles. *Spikelets* 4-5-flowered, the terminal imperfect and seated on the prolongation of the rhachilla; rhachilla jointed, smooth and glabrous or a few short hairs near the top, 3 mm. long. *Lower glume* 5-nerved, lanceolate, acute, 2.5 cm. long, glistening, smooth and glabrous, tip setaceous; upper glume similar in shape, texture and size, or somewhat longer, 5-6-nerved. *Lemmas* bearded on the callus, 10 mm. long, 9-11-nerved, rounded on the back, long bearded on the margins, below and half way up, a few villae on the dorsal surface above, bifid at the apex, central nerve continued out into a stout scabrid awn 25 mm. long, the lateral lobes acute and aristate, aristae 8-14 mm. long, palea oblong, tip obtuse or truncate, 2-keeled, keels scabrid, margins infolded. *Stamens* 3, anthers 3.5-4 mm. long. *Ovary* obovoid, glabrous; styles 2 short, stigmas plumose, long, laterally exserted.

A caespitose grass so far only found on Japvo, NAGA HILLS, at 9,900 ft.

10. AGROSTÆÆ.

Annual or perennial herbs, usually with slender culms; leaf-blades mostly narrow; spikelets usually alike and hermaphrodite, 1-flowered, small, mostly laterally compressed, pedicelled in open or contracted or spike-like panicles, very rarely in racemes; rhachilla disarticulating above the glumes, rarely below them, not produced beyond the floret or only as a point or bristle, glumes usually persistent, as long as the spikelet and enclosing the floret or sometimes shorter, rarely very small or suppressed; lemmas hyaline or membranous, thinner than the glumes or similar in texture, not or slightly changed at maturity, rarely indurated, mostly 3-5-nerved, awnless or awned from the back or less often from the entire or 2-lobed tip; awn geniculate or straight; stamens 3, 2, or 1; caryopsis mostly enclosed (often tightly) between the lemma and palea, rarely loose .

Key to the genera of *Agrostææ*.

Leaf-blades narrow, linear, flat, folded or rolled :—

Spikelets disarticulating above the glumes, the latter persistent :—

Inflorescence not spiciform; pedicels not minute :—

Glumes equal or nearly so, longer than the lemma; lemma awned from the back or awnless :—

Lemma glabrous or only with a few short hairs at the base, glumes not long acuminate :—

Lemma hyaline, shorter than the glumes :—

Rhacilla not produced (see *Agrostis abnormis*). .. 1. **Agrostis.**

Rhachilla produced, pectinate ciliate. 2. **Deyeuxia.**

Lemma coriaceous, longer than the glumes. 3. **Aulacolepis.**

- Lemma hairy or glabrous; awn basal or not; glumes long acuminate; callus long-bearded; rhachilla not produced. 4. **Calamagrostis.**
- Glumes equal or unequal, as long as the lemma or shorter; lemma awned from the tip. 5. **Muehlenbergia.**
- Inflorescence spiciform; pedicels minute. 6. **Phleum.**
- Spikelets disarticulating below the glumes, and falling entire.
- Glumes awnless :—
- Inflorescence a spike-like panicle. 7. **Alopecurus.**
- Inflorescence a loose or contracted panicle. 8. **Garnotia.**
- Glumes awned. 9. **Polypogon.**
- Leaf-blades broad, ovate, cordate; spikelets disarticulating below glumes. 10. **Sphaerocaryum.**

1. AGROSTIS Linn.

Spikelets from less than 2·5 mm. to 5 mm. long, paniced, rhachilla not produced beyond the floret or produced into a minute point or short delicate bristle, glabrous or shortly hairy. *Floret* one, hermaphrodite, shorter than the glumes. *Glumes* equal or sub-equal, usually lanceolate and acute, rarely oblong and obtuse, awnless, membranous, usually 1-nerved, keeled. *Lemma* broadly oblong, membranous, glabrous or hairy, usually truncate, 5-(rarely 3-) nerved, awned from the back or awnless; side nerves evanescent below, often excurrent into fine mucros or bristles; callus very small, glabrous, or minutely hairy or rarely bearded. *Palea* delicate, hyaline usually shorter than the lemma, or very short or obsolete, 2-nerved or nerveless. *Lodicules* 2, lanceolate, delicately hyaline. *Stamens* 3. *Ovary* glabrous; styles distinct, very short; stigmas plumose, laterally exerted. *Grain* free, enclosed in the scarcely altered floret; oblong more or less dorsally compressed, grooved in front, rarely terete; embryo short; hilum punctiform, basal.

Annuals or perennials of varying habit; blades usually flat, often flaccid; ligules membranous; panicle usually much divided, often delicate, more or less effuse or contracted, rarely spike-like; branches and branchlets fine to very fine; spikelets usually very numerous, much gaping, at least temporarily.

Key to the species of *Agrostis*.

Callus not bearded :—

Stems only 6 cm. tall. .. 1. *A. inaequiglumis*.

Stems much taller :—

Palea half as long as the lemma :—

Stoloniferous. .. 2. *A. stolonifera*.

Not stoloniferous. .. 3. *A. alba*.

Palea short or absent :—

Lemma awned. .. 4. *A. filipes*.

Lemma awnless :—

Tall, rather slender, leaves narrow;
ligules oblong up to 3 mm. long;
lemma 1.25 mm. long. .. 5. *A. micrantha*.

Stem stout; leaves broad; ligules a
membranous ring; lemma 1.5 mm.
long. .. 6. *A. myriantha*.

Callus bearded and rhachilla occasionally pro-
duced as a minute bristle. .. 7. *A. abnormis*.

1. *Agrostis inaequiglumis* Griseb. in Goett. Nachr. (1868) 80.

A densely caespitose grass growing at high elevations. *Culms* erect, 4-5 cm. tall, stout, stiff. *Leaf-blades* convolute, rarely flat 2-3 cm. long, smooth and glabrous; leaf-sheath rather loose and slipping from the culms, smooth, glabrous, striate; ligules 1 mm. long, membranous, erose.

Inflorescence a spiciform panicle, purplish in colour, dense flowered, 2.5-4 cm. long; rhachilla smooth and glabrous; branches short, often whorled; branchlets filiform, smooth and glabrous; pedicels 1-1.5 mm. long, slightly dilated at the apex, smooth and glabrous, filiform. *Spikelets* 2.5 mm. long; lower glume 2 mm. long, ovate-lanceolate, 1-nerved, minutely scabrid on the keel; upper glume 2.5 mm. long, ovate-lanceolate, 1-nerved, rarely 3-nerved; lemma 1.5 mm. long, hyaline; palea absent. *Grain* terete or spindle-shaped, 1 mm long.

BALIPARA FRONTIER TRACT, 10,000 ft. (Kingdon-Ward).

2. *Agrostis stolonifera* Linn. Sp. Pl. (1753) 62.

An entirely glabrous perennial, with numerous creeping surface stolons, rooting at the lower nodes. *Culms* ascending

from a spreading base, the decumbent portion rooting in wet soil, 20-50 cm. tall. *Leaf-blades* flat, rolled in the shoot, varying in length and breadth, usually 1-3 mm. broad, acute at the apex, rough downwards; sheaths split, smooth and glabrous, without auricles; ligules long, erect, membranous, rounded at the apex.

Inflorescence an oblong panicle, 5-15 cm. long, pale or purple, somewhat lax; the branches or some of them spiculate from the base; spikelets 2-2.5 mm. long; glumes acute, glabrous, keel scabrous; lemma shorter than the glumes, awnless or very rarely awned from the back; palea usually half to two-thirds as long as the lemma.

Introduced in Shillong and escaped.

3. *Agrostis alba* L. Sp. Pl. (1753) 63.

Differs from *A. stolonifera* in its usually erect more robust culms, sometimes as much as 1-1.5 m. tall, the base erect or decumbent, with strong creeping rhizomes; blades flat, 5-10 mm. wide; panicle pyramidal oblong, reddish, as much as 20 cm. long, the branches spreading in anthesis, sometimes contracting later; lemmas rarely awned.

Introduced in Shillong and escaped.

4. *Agrostis filipes* Hook f. in F.B.I. VII (1897) 256.

A densely tufted perennial grass. *Culms* up to 35 cm. tall, erect or ascending from a geniculate base. *Radical leaves* many, tufted, 2.5-5 cm. long, subulate, cauline rather broader and longer, almost smooth; ligule a short membranous ring.

Panicle narrow, interrupted, 5-10 cm. long; branches shortly alternate, minutely scaberulous (not smooth as indicated by Hooker). *Spikelets* seated on the inflated tips of the capillary branches. *Lower glume* lanceolate, acute, keeled, scabrid on the keel, 2 mm. long; upper glume similar but shorter about 1.75 mm. long. *Lemma* ovate-truncate, 1.75 mm. long, glabrous; a scabrid geniculate awn 1 mm. long issues from the back of the lemma and is shortly exerted; nerves very obscure lemma sometimes quite hyaline; palea

minute, hyaline. *Caryopsis* ovoid, acute at the tip. *Stamens* 3, anthers short, less than .5 mm. long.

Common about Shillong, KHASI & JAINTIA HILLS, 4-6,000 ft.

Flrs. 7-8.

5. *Agrostis micrantha* Steud. Syn. Pl. Glum. (1854)
70.

A perennial tufted grass. *Culms* up to 1 m. tall, rather slender, sometimes stout below, rather scaberulous. *Leaf-blades* 8-15 cm. long by 3-4 mm. broad, flat, sometimes rolled, scaberulous; sheath scaberulous; ligule membranous, oblong up to 3 mm. long.

Panicle 10-25 cm. long, contracted or somewhat effuse. *Spikelets* small, 1.75 mm. long, seated on the clavate pedicels on capillary, scaberulous branches, the lower of which are whorled. *The glumes* are subequal, 1.75 mm. long or up to 2 mm. 1-nerved, keeled and scabrid on the keel. *Lemma* 1.5 mm. long, ovate-truncate, 5-nerved, sometimes very obscurely glabrous, callus naked. *Palea* rectangular, hyaline, not exceeding .5 mm. long. *Stamens* 3, anthers .6 mm. long.

Common in the KHASI HILLS, 5-6,000 ft.

6. *Agrostis myriantha* Hook. f. in F. B. I. VII (1897)
257. Syn. *A. platyphylla* Mez in Fedde, Rep. Sp. Nov. XVII
(1920) 302.

A perennial grass. *Culms* up to 1.6 m. tall, stout, leafy. *Leaves* broadly linear-lanceolate, 10-30 cm. long, 3 mm.-1 cm. broad, scaberulous; ligule a narrow membranous ring.

Panicle 15-30 cm. long, contracted in flower, many- and dense-flowered; rhachis rather stout, branches fascicled or whorled, often spiculate to the base but sometimes naked for half their length; pedicels short, smooth, clavate. *Glumes* very nearly equal, 1-nerved, scaberulous on the keels or not, 2 mm. long. *Lemma* perfectly glabrous, 1.25 mm. long, ovate, truncate, awnless, 5-nerved. *Callus* naked. *Palea* minute.

Common in the KHASI HILLS, 5,000 ft.

Var. *khasiana* seems to be a more robust plant than typical *A. myriantha* and is probably not a valid variety.

Maoling Kaden, KHASI HILLS, 4,000 ft.

7. *Agrostis abnormis* Munro ex Hook. f. F. B. I. VII (1897) 268. Syn. *Deyeuxia abnormis* Hook. f. in F. B. I. VII (1897) 268. *Agrostis pleiophylla* Mez in Fedde, Rep. Sp. Nov. (1920) 301.

A densely tufted perennial, with stems 15-45 cm. tall or almost a scrambler. *Leaves* 15-20 cm. long by 4-6 mm. wide, rather rigid, scaberulous, flat or convolute; sheaths somewhat scaberulous; ligule short, rounded.

Inflorescence a contracted or effuse panicle; branches and branchlets glabrous and minutely scaberulous (Hooker states that the branches are smooth; this is not so). *The spikelets* are seated upon somewhat clavate pedicels which show a few spinose hooks here and there under a power of x 22. *The glumes* are subequal, 1-nerved, 2 mm. long, keeled, definitely scabrid on the keel. *The lemma* is 2 mm. long, not erose, 5-nerved, glabrous; palea ovate-oblong, hyaline, 1.5 mm. long. *The callus* is heavily bearded in front of the palea with hairs up to 1 mm. long. *The rhachilla* is either entirely missing or only vestigial beyond the lemma. *Caryopsis* ovate black purple, 1.2-5 mm. long rough.

Very common on the Shillong plateau. 5-6,000 ft.

A variable and most unsatisfactory plant. This grass was placed in *Deyeuxia* by Hook. f. on the grounds that the rhachilla is produced. This, however, is not a constant character and the grass bears no resemblance to other species of *Deyeuxia*. It is, in appearance, an *Agrostis* and has been described as such by Mez under the name *A. pleiophylla*. I am, therefore, removing this grass from the genus *Deyeuxia* and restoring it to *Agrostis* where it was first placed by Munro.

2. DEYEUXIA Clar.

Inflorescence a panicle often large and effuse occasionally small and contracted. *Spikelets* disarticulating above the more or less persistent glumes, 1-flowered, subterete; glumes unequal, scaberulous, lower 1-nerved, upper 3-nerved. *Lemmas* shorter than the glumes, hyaline, truncate, crenate or cleft, paleate, 5-nerved, awned from the base or further up the dorsal surface, never from the tip, nerves parallel, the median usually prolonged into the awn; palea hyaline, oblong, narrow; rhachilla jointed at the base, produced beyond the lemma,

penicillate with long white hairs—often as long as the lemma, very rarely capped by an imperfect floret. *Stamens* 3. *Lodicules* 2. *Styles* 2; stigmas plumose.

Perennial grasses, often stout but sometimes slender, usually found at high elevations in the tropics.

Key to the species of *Deyeuxia*.

Awn of lemma basal or sub-basal .. 1. *D. elatior*.

Awn of lemma inserted above the middle :—

Panicle contracted :—

Panicle 2·5-5 cm. long, erect, purplish. .. 2. *D. pulchella*.

Panicle up to 20 cm. long, nodding, pale. 3. *D. scabrescens*.

Panicle effuse. 4. *D. nagarum*.

1. *Deyeuxia elatior* Hook. f. in F. B. I. VII (1897) 266.

A tall, stout, perennial grass reaching 2 m. in height, reed-like. *Leaves* up to 1 m. long and 1·5 cm. broad, coriaceous, closely nerved, midrib prominent beneath, glabrous or hairy beneath; sheaths hirsute or glabrescent; ligules short, scarious.

Inflorescence a panicle up to 30 cm. long by 10-15 cm. broad, effuse when mature; branches and branchlets scaberulous, whorled below. *Spikelets* lanceolate 5·5-5 mm. long. *Lower glume* 5·5 mm., 1-nerved, keeled and scabrid on the keel; upper glume 5 mm. long, 3-nerved, keeled and scabrid on the keel. *Lemma* 4-4·5 mm. long, ovate-lanceolate, obscurely 5-nerved, top erose awned; awn 7-8 mm. long arising from the lemma near its base. The *lemma* is scaberulous on the dorsal surface; *palea* ovate-oblong, 4 mm. long, hyaline. *Stamens* 3, anthers 2·5 mm. long.

Common in Upper Shillong, 6,000 ft. usually gregarious beside water courses.

2. *Deyeuxia pulchella* Hook. f. in F. B. I. VII (1897) 268.

A perennial grass. *Culms* tufted, strict, erect or shortly decumbent at the base, up to 30 cm. tall, smooth and glabrous, swollen at the base with the remains of old sheaths. *Leaf-blades* involute in the Sarameti specimens (usually flat

according to Hooker) 13.5 cm. long, 2.5-3 mm. wide when flattened, smooth and glabrous, gradually tapering to the base; sheaths smooth, glabrous striate, rather inflated below, tight above; ligule 1 mm. membranous.

Inflorescence an oblong panicle up to 5 cm. long, shortly branched, branches scaberulous. *Spikelets* 4-5 mm. long, closely crowded, seated on short scaberulous pedicels; callus shortly bearded. *Lower glume* 4.5 mm. lanceolate, finely acuminate, scaberulous, 3-nerved; upper glume same shape and texture, 5 mm. long, scaberulous. *Lemma* 4 mm. long, ovate-oblong in shape, 5-nerved, the central nerve being continued out into a short stout awn 3 mm. long, inserted about 1/3 way down, the other four continued to the summit where they form 4 lobes, often almost setiform; palea hyaline 3 mm. long, obtuse, hyaline; rhachilla produced, 1.5-2 mm. long, penicillate with long white hairs, reaching almost to the summit of the lemma. *Stamens* 3, anthers 2 mm. long.

Piri and elsewhere in the BALIPARA FRONTIER TRACT, circa 11-13,000 ft.

3. *Deyeuxia scabrescens* Munro ex Duthie in Atkins, Gaz. North-West Prov. India (1882) 628.

A stout grass up to 1.5 m. tall. *Leaf blades* flat or convolute, 15-45 cm. long, up to 8 mm. broad; sheaths rather loose, minutely scaberulous; ligule very long, membranous, lacerate.

Inflorescence a contracted panicle up to 20 cm. long; branches and branchlets scaberulous. *Spikelets* 6-6.5 mm. long. *Lower glume* 5.5-6 mm. long, 1-nerved, keeled, lanceolate, scabrid on the keel and on the dorsal surface; upper glume 6-6.5 mm. long, lanceolate, acute, 3-nerved, scabrid on the keel and on the dorsal surface and minutely toothed on the margins near the apex. *Lemma* 5 mm. long, ovate-lanceolate, 5-nerved, very minutely scabrid, awned from the back about 1/3 the way down from the tip; awn scabrid, 6 mm. long; palea linear-oblong, narrow, 3 mm. long. *Anthers* 3, 2 mm. long, narrow. *Ovary* smooth and glabrous 1.5 mm. long.

Common on Japvo and Singkhu, NAGA HILLS, and also in the BALIPARA FRONTIER TRACT, circa 10,000 ft.

4. Deyeuxia nagarum Bor, Ind. For. Rec. (Bot.)
I. 3 (1938) 69.

A slender perennial grass; culms up to 1 m. tall, simple, terete, smooth and glabrous. *Leaves* linear, tapering to a fine point, rounded at the base, almost smooth, soft, pale green shortly and distantly pilose on the upper surface, glabrous on the lower surface, margins minutely scaberulous, up to 30 cm. long, 4 mm. broad; sheaths loose, slipping from the culm, smooth and glabrous, striate; ligules membranous, up to 2 mm. long.

Inflorescence a very lax panicle with spreading branches; branches 3-4-5-nate on a straight slender axis, filiform, flexuous, branching, almost smooth; pedicels shorter than the spikelets, dilated at the tip. *Spikelets* lanceolate, gaping, awned, 4.5-5.5 mm. long; lower glume ovate-lanceolate when flattened, almost smooth, 4.5-5.5 mm. long, scarious, aristate, 1-nerved; upper glume 5 mm. long, lanceolate, aristate, almost smooth, 3-nerved, margins scarious; lemma 3.5-4 mm. long, broadly lanceolate, 5-nerved, hyaline, tip acute, very readily dividing into 5 aristæ which are the prolongations of the nerves, smooth on the back below the middle, very minutely scaberulous with downwardly directed spines below the tip; awn 4-5 mm. long, filiform, antrorsely scabrid, inserted on the lemma one-fifth to one quarter the length of the lemma below the tip; palea lanceolate-oblong, tip acute or obtuse, 2-nerved, 2.5-3 mm. long; rhachilla 1 mm. long, naked for half its length, the upper half thickly clothed with white hairs 3 mm. long. *Anthers* 3, 1.5 mm. long, very narrow. *Styles* 2, plumose.

Found on Japvo, NAGA HILLS at about 9,500 ft.

3. AULACOLEPIS Hack.

Spikelets 1-flowered, arranged in an effuse panicle, lanceolate, laterally compressed; rhachilla articulate above the glumes and produced beyond the upper floret into a short, naked stipe. *Glumes* two, persistent on the pedicel, unequal, carinate, muticous, membranous, 1- to 3-nerved, $\frac{1}{4}$ - $\frac{1}{3}$ shorter than the lemma. *Lemma* equalling the spikelet in length, chartaceous-membranous to coriaceous, lanceolate, muticous.

with an entire, acute, hyaline tip, keeled on the back, 5-nerved; callus short, obtuse, glabrous or bearded; palea equal to the lemma in length, membranous, acute, entire, 2-nerved, 2-keeled, deeply sulcate between the keels. *Lodicules* 2, cuneate. *Anthers* 3, linear. *Ovary* oblong, glabrous; styles very short; stigmas plumose.

Tall slender, leafy grasses; leaves flat, flaccid; lemmas coriaceous. *la*

***Autolepis treutleri* Hack.** in Fedde, Rep. Spec. Nov. III. 242. Syn. *Deyeuxia treutleri* Stapf in Hook. f. F. B. I. VII (1897) 269.

Culms geniculate at the rooting base then erect, up to 50 cm. tall, very glabrous, smooth, terete and shining, leafy to the panicle. *Leaves* linear-lanceolate, flat, soft, dark green, gradually terminating in a fine point, finely nerved, scabrous on both surfaces and on the margins, up to 25 cm. long, 1-1.5 cm. broad, sheathes minutely asperulous, rather lax, exceeding for the most part the nodes of the culms in length; ligule 2-3 mm. long, truncate.

Inflorescence an ovate-oblong panicle about 25 cm. long, 10 cm. broad, lax, patent, with 5-7-nate filiform or sub-capillary scabrid branches. *Spikelets* ovate-lanceolate 2.5-2.8 mm. long; lower glume 1.5-1.7 mm. long, 1-nerved, very scabrid; upper glume 2-2.4 mm. long, 1-nerved, scabrid; lemma ovate-lanceolate, 2.5-2.8 mm. long, rather obtuse, scabrid above, callus glabrous; palea obtuse, scaberulous above. *Anthers* 3, 1.3 mm. long. *Rachilla* produced, glabrous, about 1 mm. long, attenuate at the top, rarely supporting a rudimentary glume.

Collected on Piri, 10,000 ft., AKA HILLS.

4. CALAMAGROSTIS Adans.

Spikelets lanceolate-acuminate, crowded on the numerous scaberulous or smooth branchlets of an effuse or contracted panicle. *Glumes* lanceolate-acuminate, unequal, the lower shorter 1-nerved, the upper longer 3-nerved, scaberulous on the keels, not jointed on the pedicels; rachilla jointed below the lemmas and not produced (or very occasionally produced); callus long or short bearded. *Lemmas* hyaline

(*Autolepis*)

much shorter than the glumes, 5-nerved, often cleft at the apex, glabrous or hairy on the dorsal surface; palea shorter than the lemma, hyaline. *Stamens* 3, anthers long or short. *Lodicules* 2. *Grain* free within the lemma and palea.

Stout or slender grasses, often tall with long flat leaves. *Inflorescence* an effuse or contracted panicle, often silky, shining.

Key to the species of *Calamagrostis*.

Callus hairs longer than the lemma	.. 1. <i>C. emodensis</i> .
Callus hairs shorter than the lemma	.. 2. <i>C. griffithiana</i> .

1. *Calamagrostis emodensis* Griseb. in Goett. Nachr. (1868) 80.

Culms stout, erect from a creeping geniculate base, up to 1.5 m. tall; bases of the culms clothed with the remains of old sheaths. *Leaf-blades* 30-40 cm. long up to 8 mm. wide, flat, flaccid or thinly coriaceous, scabrous on both surfaces, long, tapering to a fine point, many-nerved, glabrous; sheaths scaberulous, striate, rather loose; ligule oblong, membranous.

Inflorescence an effuse, soft, shining panicle up to 20 cm. long; branches whorled, naked for half their length; branches and branchlets capillary minutely scaberulous or smooth. *Spikelets* numerous crowded. *Lower glume* 6 mm. long, lanceolate, long acuminate, 1-nerved, scarious on the margins, scabrid on the keel; upper glume 6.5-7 mm. long, lanceolate, long acuminate, scabrid on the keel, scarious on the margins. *Lemmas* glabrous on the dorsal surface, 2.5 mm. long, overtopped by the long (4 mm.) callus hairs, awned from below the tip, faintly 5-nerved; awn up to 7 mm. long; palea 2 mm. long, lanceolate, hyaline. *Grain* spindle-shaped, 1 mm. long.

Japvo, NAGA HILLS, 9,900 ft.

2. *Calamagrostis griffithiana* Hook f. in F. B. I. VII (1897) 263.

Culms stout, often tufted, erect, smooth, terete, glabrous and shining, up to 1 m. tall. *Leaf-blades* linear-lanceolate, sub-coriaceous, 15-25 cm. long by 3-4 mm. broad, smooth and glabrous on both surfaces; sheaths rather loose, striate,

smooth and glabrous or minutely scaberulous; ligule truncate, scaberulous, 2-3 mm. long.

Panicle long, narrow, 6-20 cm. long, decompound, branches and branchlets sub-erect, capillary, smooth or scaberulous, glabrous; branches 5-10 cm. long, 2-5-nate, naked for half their length, thin, with crowded branchlets and shortly pedicelled green or purplish spikelets. *Spikelets* 3·25 mm. long or just under; lower and upper glumes subequal, lanceolate, acute, 3·25 mm. long, 1-nerved, scabrid on the keel; lemma ovate truncate, 4·5-nerved, hairy all over on the back, the four nerves being continued as 4 short bristles, callus hairs very short, awn sub-basal to median, exserted, 5-6 mm. long; palea nearly as long as the lemma, hyaline, obtuse. 2-nerved; stamens 3, anthers 1·25 mm. long, linear.

Very common on the hills about Shillong, Mawphlang, and elsewhere, 5-6,000 ft.

5. MUEHLENBERGIA Schreb.

Spikelets 1-flowered, the rachilla disarticulating above the glumes; glumes shorter than the lemma; lemma firm-membranaceous, 3-nerved, with a short callus, pilose, apex acute, awned from the tip, or from between very short lobes, the awn straight or flexuous. *Palea* as long as the lemma, 2-nerved, almost uniting in the tip. *Lodicules* 2, very minute. *Anthers* short or long. *Styles* free. *Stigmas* short. *Caryopsis* cylindric, free in the glume and palea.

Annual or perennial, very slender grasses. *Leaves* narrow flat.

Muehlenbergia huegelii Trin. in Mem. Acad. Peters. ser. 6, VI. II. (1845) 293. Syn. M. viridissima Nees ex Steud. Syn. Pl. Glum. (1854) 178.

A perennial grass. *Culms* rather weak and often scrambling over other vegetation, up to 1·6 m. long. *Leaf-blades* flat, 8-15 cm. long, 4-8 mm. broad, scabrid, linear-acuminate, sheaths loose; ligule a membranous ring, lacerate.

Panicle elongate, much fastigiately branched, up to 20 cm. long, flexuous, interrupted, branches and pedicels slender. *Spikelets* seated upon scabrid pedicels, up to 2 mm. long.

Lower glume 1 mm. long, strongly 1-nerved, ovate-lanceolate, scabrid on the keel; *upper glume* 1.5 mm. long, 1-nerved, scabrid on the keel. *Lemma* ovate-lanceolate, 2.2-5 mm. long, hairy below the middle, 3-nerved, the centre nerve produced into a long, slender, flexuous awn, 2 cm. long; *palea* as long as the lemma, ovate-lanceolate, 2-nerved, 2-keeled, hairy below the middle.

KHASI HILLS & NAGA HILLS. A forest grass.

6. PHLEUM Linn.

Spikelets 1-flowered, laterally compressed, imbricate in cylindric or oblong spiciform panicles, disarticulating above the glumes; pedicels very short. *Glumes* equal, membranous, keeled, abruptly awned or mucronate or gradually acute. *Lemma* shorter than the glumes, hyaline, broadly truncate, 3-5-nerved; *palea* narrow nearly as long as the lemma.

Annual or perennial grasses with erect culms, flat blades and dense cylindric panicles.

Phleum pratense Linn. Sp. Pl. (1753) 59.

A tufted perennial; culms erect, 40-70 cm. tall; nodes short, often violet coloured; smooth and glabrous. *Leaves* linear, erect, tapering to a fine point, midrib prominent, smooth and glabrous, up to 20 cm. long, 4-8 mm. wide, auricles absent; sheath terete, smooth and glabrous, close fitting; ligule white, membranous, erose, up to 4 mm. long.

Inflorescence a cylindrical false spike, 3-15 cm. long, usually about 7 cm. The spikelets are densely crowded, seated upon very short, erect, scaberulous branches; 1-flowered, rhachilla disarticulating above the glumes. *Lower glume* 2.5-3.5 mm. long, oblong, rounded at the top, keeled, villous, central nerve produced into an awn-like point, 1-1.5 mm. long; keel ciliate with stiff hairs. *Upper glume* similar in shape, texture and nervation. *Lemma* hyaline, 1.5-1.75 mm. long, broadly ovate, truncate, toothed, 3-5-nerved, central nerve produced into a short awn or not; *palea* narrow, hyaline, 1.25-1.5 mm. long. *Lodicules* 2. *Stamens* 3, anthers

1 mm. long. *Ovary* glabrous, styles long. *Caryopsis* spherical-ovoid in shape, surface finely reticulate, separating easily from lemma and palea.

Introduced into Shillong and escaped.

7. ALOPECURUS Linn.

Spikelets narrowly to broadly oblong or elliptic-oblong, strongly laterally compressed, usually awned, falling entire, closely to densely imbricate, shortly pedicelled in solitary spiciform panicles or racemes; rhachilla disarticulating below the glumes and not between the glumes and the floret, not produced beyond the floret. *Floret* 1, hermaphrodite, enclosed by the glumes or with the apex slightly exserted. *Glumes* deciduous, equal or sub-equal, similar, lanceolate to oblong in profile, acute or obtuse, awnless, cuspidate and shortly awned, strongly compressed and keeled, usually connate by their margins in the lower part or up to the middle. 3-nerved, membranous to herbaceous, scabrid or ciliate on the keels, with keels narrowly winged or wingless.

Lemma as long as the glume or very slightly longer, more or less oblong or ovate-oblong, obtuse, apiculate or truncate, hyaline and membranous, 3-5-nerved, with the nerves more prominent upwards, glabrous or pubescent at the apex, usually connate along its margins towards the base, awned from the back below the middle, rarely from above the middle; awn exserted or enclosed; palea usually appressed, rarely present and then narrow, 1-nerved, hyaline, up to nearly as long as the lemma. *Lodicules* suppressed. *Stamens* 2-3; anthers linear to oblong-elliptic. *Ovary* glabrous; styles usually more or less connate; stigmas elongate shortly plumose, terminally exserted. *Grain* laterally compressed, free between the lemma and palea, oblong or elliptic in outline; hilum subasal; embryo $\frac{1}{2}$ - $\frac{1}{4}$ the length of the grain.

Annuals or perennials, loosely to densely tufted, or with geniculately ascending and spreading culms, ligules membranous, glabrous; blades linear, usually flat, inflorescences dense, cylindric to oblong, ovate or sub-globose, rather soft; pedicels with thickened discoid tips; spikelets protogynous.

Key to the species of *Alopecurus*.

Spikelets 5 mm. long. ..	..	..	1. <i>A. myosuroides</i> .
Spikelets 2 mm. long. ..	..	..	2. <i>A. geniculatus</i> .

1. *Alopecurus myosuroides* Huds. Flor. Angl. (1762) 23. Syn. *A. agrestis* Linn. Sp. Pl. Ed. II. 89.

Annual, 25-90 cm. high. *Culms* loosely tufted or solitary, erect or geniculate in the lower part, slender to somewhat stout, simple or branched from the lower nodes, 2-4-noded, glabrous, smooth or finely scaberulous towards the nodes and inflorescence. *Leaves* glabrous; sheaths finally shorter than the internodes, striate, rather loose, smooth or finely scaberulous, the uppermost sometimes slightly inflated; ligule truncate, 1 mm.-2.5 mm. long, membranous, asperulous on the back; blade linear, tapering to a slender acute or obtuse tip, 2.5-22.5 cm. long, 1.5-8 mm. wide, flat, scaberulous on the nerves or rarely smooth.

Inflorescence dense cylindrical, tapering towards the apex, erect or slightly nodding, 2.5-10 cm. long, 3-8 mm. in diameter, green or purplish; rhachilla ribbed, smooth or slightly scabrid; pedicels .6-.3 mm. long, rigid. *Spikelets* oblong to elliptic-oblong, closely imbricate, 6 mm. long. *Glumes* lanceolate-oblong and acute in profile, connate for $\frac{1}{4}$ - $\frac{1}{2}$ their length, stiffly ciliolate on the keels below the middle and scabrid above, glabrous on the sides or sparingly pubescent. *Lemma* oblong, obtuse, membranous with herbaceous tip, glabrous smooth, 5-nerved, awned from near the base, awn up to 11 mm. long, antrorsely scabrid, geniculate or curved; palea absent; anthers 2-3 mm. long. *Grain* laterally compressed, free.

NAGA HILLS, in irrigated rice terraces. 4-6,000 ft. KHASI HILLS, 3,000 ft.

2. *Alopecurus geniculatus* Linn. Sp. Pl. (1753) 60.

An annual or sub-perennial grass. *Culms* erect or geniculate at the base, rooting at the nodes, 20-60 cm. tall, stout or slender. *Leaf-blades* lanceolate, abruptly contracted or rounded at the base, up to 6 cm. long, 3-4 mm. broad, glabrous and smooth or nearly so; upper sheaths more or less

inflated, smooth and glabrous, striate, ligule 3-4 mm. long, membranous, erose.

Inflorescence a cylindric or oblong, spiciform panicle, 2.5-7.5 cm. long, 6-8 mm. in diameter, greenish yellow in colour. *Spikelets* strongly compressed, 2.75 mm. long. *Glumes* equal, connate at or above the base, sub-acute or obtuse, 2.75 mm. long, hyaline, ciliate; lemma truncate 2.5 mm. long, awned from the base, tip truncate, sub-erose; awn up to 4.5 mm. long. *Stamens* 2 or 3, linear, orange.

Collected by Griffith in Assam. It has not been collected since his time.

8. GARNOTIA Brongn.

Spikelets solitary or geminate, narrowly lanceolate, articulate on their pedicels. *Lower* and upper glumes subequal, 3-nerved, acuminate, or upper obtuse, equalling or longer than the lemma, awned or not. *Lemma* hermaphrodite articulate at the base, 1-3-nerved, very narrow, terete, acuminate or notched at the tip, terminally awned, rarely awnless or 3-awned, margins of the palea dilating at the base into auricles which clasp the linear or oblong grain.

Erect perennial or annual grasses with flat or convolute leaves.

Key to the species of *Garnotia*.

- | | | |
|---|----|------------------------|
| A tall plant; spikelets 4 mm. long, green; | | |
| leaves narrow complicate. | .. | 1. <i>G. stricta</i> . |
| A dwarf plant; spikelets 4.5 mm. long, pur- | | |
| plish; leaves broad, flat. | .. | 2. <i>G. emodi</i> . |

1. *Garnotia stricta* Brongn. in Duperr. Voy. Bot. (1829) 133. t. 21.

Annual or perennial (?). *Culms* up to 1 m. tall, erect from a geniculate base, glabrous, smooth, striate, often tufted, nodes often bearded. *Leaf-blades* 15-25 cm. long, up to 1 cm. broad, linear-lanceolate, flat or margins involute, scabrid, when young with longish white hairs on the surface; sheaths glabrous and smooth outside, margins hirsute, sometimes densely, hairy on the collar and at the throat; ligule a membranous ring topped with short crowded cilia.

Inflorescence a strict or flaccid panicle. *Spikelets* seated upon short scabrid pedicels at the ends of capillary and scabrid branches. *Rhachilla* disarticulating below the glumes and the spikelet falls entire; there is a tuft of hair just below the glumes and above the joint. *Rhachis* triangular in section, the two lateral angles scabrid; lower glume membranous, 3-nerved, rounded on the back, lanceolate with or without an arista, nerves scabrid on the back, 4 mm. long; upper glume of similar texture and nervation, tip obtuse, aristulate or not. *Lemma* lanceolate, 3 mm. long, somewhat thickly membranous, tapering to a scabrid awn which may be 11 mm. long. (In Hook. f. F.B.I. the lemma is described as 1-nerved, 2 other exceedingly fine nerves may sometimes be made out, they are very obscure). *Palea* nearly as long as the lemma with margins clasping the grain, hyaline. *Grain* terete, 2 mm. long, embryo $\frac{1}{3}$ the length of grain. *Stamens* 3, anthers 1.5 mm. long.

Hook. f. in F.B.I. VII. 243, mentions two varieties var. *khasiana* a stout form and var. *breviaristata*; with regard to the latter the possession of awns by the glumes is a very variable character and spikelets in the same plant may differ in this respect. It is probably not a good variety.

A specimen of this plant collected on Pulebadze, Naga Hills, is only 9 cm. tall with leaves 2-3 cm. long, spikelets normal but with aristæ as long as the spikelets.

Very common and variable plant in the hills, 4-7,000 ft.

2. *Garnotia emodi* (Arn. et Nees) Janowsky in Fedde, Rep. Spec. Nov. XVII (1921) 86. Syn. *G. polygonooides* Munro ex Oliver in Hook. Ic. Pl. t. 1481.

A small tufted, slender grass. *Culms* up to 20 cm. tall, *Leaf-blades* flat, slightly rounded at the base, broadly lanceolate, tapering to a sharp point, 10-15 cm. long, by 3-6 mm. broad with sparsely scattered, short, white hairs from bulbous bases; sheaths smooth longer than the internodes, with often a few short, white hairs from bulbous bases; ligule a short membranous collar.

Inflorescence a contracted, erect, panicle purplish in colour; branches and branchlets angled, minutely scabrous; pedicels slightly dilated at the apex. *Spikelets*

4·5 mm. long. bearded at the base. *Lower glume* 4 mm. long, lanceolate, purplish, 3-nerved, awned from the tip; awn up to 1 cm. long or shorter; upper glume 4·5 mm. long, more broadly lanceolate than the lower, awned from the tip with an awn up to 2 cm. long; lemma stipitate, 4·5 mm. long, hyaline, 2-lobed at the top with the lobes shortly aristate, awned in the sinus; central awn up to 3 cm. long, very slender, flexuous; palea 3·5 mm. long, obtuse, lanceolate, hyaline. *Stamens* 2 (3 ?); anthers linear, 1·5 mm. long. *Ovary* minute; stigmas plumose.

BALIPARA FRONTIER TRACT, 10,000 ft. (Kingdon-Ward).

9. POLYPOGON Desf.

Spikelets 1-flowered, in dense spike-like, often lobed panicles, disarticulating from the pedicels; rhachilla disarticulating below the lemma, not produced; flowers hermaphrodite. *Glumes* 2, sub-equal, awned from the entire or 2-lobed tips. *Lemma* shorter than the glumes, very thin to hyaline, glabrous, truncate, faintly or obscurely 5-nerved, the lateral nerves shortly excurrent or evanescent with the hyaline tips; awn very fine, usually deciduous, subterminal, sometimes reduced to a mucro or absent. *Palea* 2-keeled, slightly shorter than the lemma. *Lodicules* 2, delicate. *Stamens* 3. *Ovary* glabrous; style distinct, very short; stigmas laterally exerted, loosely plumose. *Grain* oblong, subterete or slightly grooved, enclosed by the unaltered lemma and palea.

Key to the species of *Polypogon*.

- | | | |
|---|-------|------------------------------|
| Awns 5·9-75 mm. long, 2-3 times the length of the glumes. | .. .. | 1. <i>P. monspeliensis</i> . |
| Awns 1·25-3·75 mm. long, as long as or shorter than the glumes. | .. .. | 2. <i>P. fugax</i> . |

1. *Polypogon monspeliensis* Desf. Fl. Atlant. i. 67.

An annual tufted grass, stout or slender, from a geniculate base. 15-60 cm. high. *Leaves* flat, linear, gradually tapering to a point, scabrid, glabrous; sheath striate, scaberulous, inflated; ligules up to 6 mm. long, membranous, lacerate, ciliolate.

Panicle spike-like, cylindric, sometimes lobed or interrupted below, 3.5-12 cm. long, light green or straw-coloured, branches with numerous branchlets from the base, scaberulous; lateral pedicels extremely short, disarticulating near the base; spikelets 2-2.5 mm. long; glumes sub-equal, linear or oblanceolate-oblong, shortly 2-lobed or emarginate, scaberulous, ciliate or ciliolate, awn up to 8 mm. long; lemma 1.25 mm. long, broadly ovate-truncate, minutely 2-4 mucronulate, nerves very obscure; awn as long as the lemma or shorter or absent; palea 2-toothed or 2-mucronulate, almost as long as the lemma; stamens 3, anthers about .5 mm. long, lodicules 2. *Caryopsis* about 1.5 mm. long, subterete, grooved.

BALIPARA FRONTIER TRACT, 9,000 ft.

2. *Polypogon fugax* Nees ex Steud. Syn. Pl. Glum. I. (1854) 184. Syn. P. *higagaweri* Steud. Syn. Pl. Glum. I (1854) 422.

Annual. *Culms* erect from a geniculate base. *Leaves* linear, flat, very scabrid, 6-10 cm. long, 3-5 mm. broad tapering to a point; sheaths somewhat inflated, smooth and glabrous, striate; ligule membranous, lacerate, up to 6 mm. long.

Inflorescence a spike-like panicle. *Branches* and branchlets scabrous; branchlets crowded. *Spikelets* very small, 2 mm. long, awned, seated on very short pedicels, articulated at the base, gaping. *Glumes* subequal, ovate-oblong, 2 mm. long, 1-nerved, apex 2-lobed, the nerve being continued out between the lobes into an antrorsely scabrid awn up to 3.5 mm. long, or shorter, scabrid on the keels and scaberulous on the dorsal surface, margins ciliolate. *Lemma* nearly 1.5 mm. long, ovate, truncate, very delicate, obscurely 5-nerved, the nerves ending in minute teeth which crown the truncate apex; an antrorsely scabrid awn, 1.5 mm. long, issues from the dorsal surface; palea narrowly oblong, 2-toothed or 2-mucronulate, 1 mm. long, hyaline. *Achenes* .5 mm. long. *Ovary* glabrous; styles short; stigmas plumose.

NAGA HILLS.

10. SPHÆROCARYUM Nees.

Spikelets 1-flowered, very minute, ovoid, pedicelled on the close-set, capillary branches of a pyramidal panicle, sessile in the axils of the uppermost leaf-sheath, jointed on the pedicels, rhachilla jointed at the base, not produced. *Glumes* 2, cymbiform, glabrous, hyaline. *Lemma* cymbiform, hirsute. *Palea* as long as the lemma. *Stamens* 3, anthers linear. *Lodicules* 2. *Ovary* narrowly ellipsoid; styles short free. *Grain* ovoid free, pericarp adherent to the seed.

A dwarf annual; stem creeping and ascending, leafy throughout. *Leaves* ovate cordate, acute, amplexicaul.

Sphærocaryum malaccense (*Trin.*) *Pilger* in Fedde, Rep. Spec. Nov. XLV (1938) 1. *Syn.* *S. pulchellum* (Roth) Merr. in Phil. Journ. Soc. Bot. XI (1916) 52; *S. elegans* Nees ex Steud. Nom. Ed. II. 2. 620.

An annual. *Culms* very slender from a creeping or geniculate base, leafy to the top. *Leaves* all alike in size and form, ovate, cordate, amplexicaul, acute or acuminate, ciliate, serrulate, sub-coriaceous, ecostate, nerves very close-set; sheaths shorter than the internodes, usually sparsely hirsute but very much so at the nodes; ligule a ring of short, white, stiff hairs.

The panicle is up to 4 cm. long by 3 mm. broad, solitary and terminal in the axil of the uppermost leaf-sheath, or very occasionally one or two others lower down on the stem also in the axils of leaves; branches many, opposite or alternate, they and the rhachis smooth and glabrous. *Spikelets* minute, 1-1.5 mm. long, ovoid to globose. *Lower glume*, cymbiform, hyaline, tip obtuse, 1 mm. long, upper glume similar in shape but 1-nerved. *Lemma* broadly ovate, convolute, 1-nerved, very hairy on the back, barely 1 mm. long; *palea* almost as long as the lemma, hirsute. *Stamens* 3, anthers .5 mm. long linear. *Lodicules* 2, minute. *Ovary* narrowly ellipsoid, glabrous. *Style* minute, stigmas shortly branched.

Very common in marshy places in the hills, 4-6,000 ft.

11. STIPEÆ.

Annual or perennial herbs, frequently with tough, rigid culms; leaf-blades narrow; spikelets all alike, hermaphrodite, 1-flowered, arranged in open or contracted panicles, very rarely solitary; rhachilla disarticulating above the glumes, not produced beyond the floret; glumes mostly persistent, one or both usually as long as or longer than the floret; lemma usually terete with convolute or involute margins, rarely dorsally compressed, becoming rigid and indurated at maturity, 3- to 7-nerved with the nerves close together at the apex, often with a bearded, basal callus, awned from the entire or minutely 2-lobed tip, with the awn simple or divided into three branches, rarely awnless; lodicules 3 or 2; stamens 3; caryopsis tightly embraced by the lemma and palea.

Key to the genera of *Stipeae*.

Awn tripartite.	..	..	..	1. <i>Aristida</i> .
Awn simple.	..	..	..	2. <i>Stipa</i> .

1. *ARISTIDA* Linn.

Spikelets 1-flowered, arranged in panicles; rhachilla disarticulating above the glumes, not produced. *Glumes* usually persistent, narrow, 1-3-nerved, muticous or mucronate, occasionally shortly awned. *Lemma* convolute, cylindric, faintly 3-nerved, 2-fid or entire at the tip; villous, shortly bearded, usually pungent; awn nearly always 3-partite from the base or above the base, continuous with the lemma or jointed to it, foot straight or twisted, bristles plumose, or the lateral or all naked; palea small, oblong, 2-nerved or nerveless. *Lodicules* 2. *Stamens* 3. *Ovary* glabrous; styles distinct, short; stigmas plumose, laterally exserted. Grain slender cylindric or oblong-cylindric, terete, sometimes grooved, tightly embraced by the lemma; hilum linear, almost as long as the grain; embryo short or long.

Annual, or more often perennial, tufted grasses with wiry culms and narrow, usually convolute leaves; ligule a fringe of hairs; panicle spike-like or effuse.

***Aristida adscensionis* Linn. Sp. Pl. (1753) 82.**

An annual or perennial, densely tufted grass. *Culms* 25-60 cm. long, very slender, simple or branched, sometimes geniculate at the base. *Leaves* 6-25 cm. long, 1-2 mm. broad, convolute, filiform, smooth or scaberulous, sheaths smooth with rounded auricles; ligule a ridge of soft hairs.

Inflorescence a linear spike-like panicle, usually interrupted, sometimes oblong, more or less lax, rigid or flaccid; branches single or 2-nate, unequally branched from the base, or simple to the middle, erect or nodding or flexuous, filiform, scabrid; lateral pedicels short. *Spikelets* 6-8 mm. long, one-flowered, often purplish. *Glumes* linear to linear-lanceolate, acute or sub-obtuse, 1-nerved; the lower 4.5-6 mm. long, the upper 7.5 mm. long (or longer up to 8 mm.), sometimes mucronate. *Floret* one, hermaphrodite; lemma linear, laterally compressed, as long as the upper glume or slightly longer, rarely shorter, scabrid along the keel and the outer nerves, otherwise smooth, or scabrid below the straight tip; callus .5 mm. long; awn trifid; central branch up to 15 mm. long or even longer, lateral branches diverging and somewhat shorter than the central, continuous with the lemma; palea obtuse, less than 1 mm. long. *Lodicules* 2, similar to palea, 2-3-nerved. *Anthers* up to 2 mm. long. *Caryopsis* as long as the lemma.

River beds in GOALPARA.

2. STIPA Linn.

Spikelets narrow, 1-flowered, arranged in panicles; rhachilla disarticulating above the glumes, not produced. *Glumes* usually persistent, 1-3-nerved, muticous or mucronate, *Lemma* convolute, cylindric or oblong cylindric, 5-7- (rarely 3-) nerved, rather rigid, tip gradually tapering or minutely 2-lobed; callus more or less bearded, usually pungent; awn simple, continuous with or jointed on the lemma, bent or geniculate, twisted below, plumose or naked above the knee; palea

2-keeled or 2-nerved, almost as long as the lemma or much shorter. *Lodicules* usually 3. *Stamens* 3. *Ovary* glabrous; styles distinct; stigmas plumose. *Grain* cylindric, tightly embraced by the hardened lemma and palea.

Perennial, rarely annual, grasses with convolute, rarely flat, leaves; ligules membranous; panicle spike-like to effuse.

Stipa roylei (Nees) Mez in Fedde, Rep. Spec. Nov. XXVII (1921) 207. Syn. *S. orthoraphium* Steud. Syn. Pl. Glum. (1854) 131.

A perennial grass with densely tufted stems. *Culms* slender, up to 60 cm. tall, smooth and glabrous. *Leaf-blades* 15-30 cm. long, flat or convolute, 2-4 mm. broad, glabrous, somewhat scabrid; sheaths auricled, smooth and glabrous, except on the margins, which are hirsute and scabrid; ligule a membranous lacerate ring, ciliate.

Inflorescence a narrow panicle 15-25 cm. long; branches few, short, erect, smooth and glabrous; pedicels short, bearing 1-flowered, terete, erect spikelets; rhachilla not produced, disarticulating above the glumes and below the floret. *Lower glume* 9 mm. long, membranous 3-nerved, oblong, tip obtuse; upper glume similar in shape and texture, 10 mm. long. *Lemma* 10 mm. long, indurated, subulate; callus obconic, bearded, short; awn up to 2.5 cm. long, stout, not twisted, jointed on the lemma, with 2 or more deflexed spinules towards the base; palea about 7 mm. long, hyaline, margins involute. *Lodicules* 2, large. *Stamens* 3; anthers long. *Ovary* small, glabrous.

Japvo and Saramethi, NAGA HILLS, 9-10,000 ft.

12. ZOYSIÆ.

Spikelets hermaphrodite or some hermaphrodite and others male, 1-flowered, falling entire, either singly or in clusters of 2 to 5, in slender spiciform panicles or racemes; rhachilla usually not produced beyond the floret; glumes equal or the lower much smaller or suppressed, awnless or with a straight awn from the tip, the upper or both often indurated; lemma shorter than the upper glume, hyaline or delicately membranous, 1- to 3-nerved, usually awnless; lodicules 2 or 0; stamens 2 or 3.

Low annual or perennial herbs; leaf-blades short and often rigid.

Key to the genera of *Zoysiæ*.

Glumes awned : spikelets solitary. .. 1. **Perotis**.
Glumes awnless : spikelets in clusters of 2-5. 2. **Tragus**.

1. PEROTIS Ait.

Spikelets very small, narrow, sessile or sub-sessile on the continuous axis of a spike or a lax spike-like raceme, jointed on and falling entire from the axis or the rudimentary pedicels. rhachilla not continued beyond the floret. *Floret* 1, hermaphrodite, much shorter than the glumes. *Glumes* equal, linear or linear-lanceolate, rigidly membranous, 1-nerved, passing into capillary awns. *Lemma* lanceolate, acute, delicately hyaline, 1-nerved. *Palea* very minute, hyaline, nerveless. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Styles* distinct, short; stigmas plumose, laterally exserted. *Caryopsis* cylindric, slender, exserted from the unchanged floret and enclosed with it in the glumes; embryo $\frac{1}{3}$ the length of the caryopsis; hilum punctiform, basal.

Annuals or perennials; culms leafy; blades usually broad, rigid and ciliate; ligules hyaline; spikes or pseudo-spikes slender, villous from the long capillary awns.

Tropics of the Old World and the sub-tropics of Australia.

Perotis indica (Linn.) O. Kuntze, Rev. Gen. Pl. (1891) 787. Syn. *P. latifolia* Ait. Hort. Kew. I (1789) 85.

A tufted wiry annual or sub-perennial grass. *Culms* up to 45 cm. tall erect from a geniculate base, smooth and glabrous. *Leaf-blades* flat, ovate or lanceolate, base cordate, tapering to an acute tip, surfaces smooth and glabrous, margins spinulose, 1.2-5 cm. long, 4 mm. to 1 cm. broad; sheaths short, loose, striate, smooth and glabrous, margins scarious; ligule a very minute, membranous ridge; upper margin erose or ciliate.

Inflorescence a spike-like terminal raceme consisting of numerous small spikelets seated upon very short pedicels on a central, simple, scabrid rhachis which is 2.5-20 cm. long. *Spikelets* 2.5-4 mm. long; callus conical. *Glumes* subequal, 2.5-4 mm. long, linear, narrow, scabrid or hispid, tapering into a scabrid, purple awn up to 1.5 cm. long. *Lemma* 1 mm. long, hyaline, narrowly lanceolate; palea narrow, about as long as the lemma, hyaline. *Stamens* 3. *Styles* 2. *Lodicules* 2. *Grain* linear, terete, nearly as long as the glumes and free within them.

Found in the plains portion of the GARO HILLS and doubtless elsewhere in the province. In other parts of INDIA it ascends to 6,000 ft. This grass is a good fodder and is relished at all stages by stock.

2. TRAGUS Haller.

Spikelets sessile, in deciduous clusters of 2-4, on the filiform, continuous axis of a cylindric, spike-like panicle; rhachilla tough, not continued beyond the floret. *Floret* 1, hermaphrodite, somewhat shorter than the upper glume. *Glumes* very dissimilar, the lower facing the rhachis, minute, hyaline, or suppressed, upper 5-ribbed or 5-nerved, membranous between the hispid or spine-hooked ribs and nerves, exceeding the lemma. *Lemma* lanceolate to lanceolate-oblong, membranous, 3-nerved; palea as long as the lemma, 2-nerved. *Lodicules* 2, broad, cuneate, fleshy. *Stamens* 3. *Style* distinct, very slender; stigmas narrow, plumose, laterally exerted. *Caryopsis* enclosed by the lemma and palea, oblong to ellip-

soid, slightly compressed from the back; embryo $1/3$ length of the caryopsis; hilum punctiform, basal.

Annuals or perennials; culms erect, ascending or decumbent; blades linear, rather rigid, with cartilaginous, spinulosely-ciliate margins; ligules reduced to a delicate rim; panicles cylindric, slender; all the spikelets of a cluster fertile, or often one more or less reduced.

Tragus biflorus Schult. Mant. II (1767) 205. Syn. T. racemosus Scop. Introd. His. Nat. (1777) 73.

An annual or perennial grass. *Culms* short, rigid, decumbent, spreading or erect, leafy almost to the top, 5-20 cm. tall. *Leaf-blades* flat, lanceolate, narrow, base subcordate, glabrous, margins distantly spinulose .6-5 cm. long, 3-4 mm. wide; sheaths long, the uppermost almost like a spathe, loose, margins scarious and minutely ciliate; ligule a dense ridge of stiff hairs.

Inflorescence a spike-like raceme, consisting of a scabrid central axis upon which are packed sessile spikelets 3.2 mm. long, in groups and deciduous clusters, usually of 2 spikelets facing each other, seldom 3, and very rarely 4 or 5, not or obscurely articulated on a short peduncle, which is itself articulate on the rhachis, 1-flowered. *Racemes* 1.5-7 cm. long. *Lower glume* usually suppressed, if present, very minute and hyaline; upper glume narrowly lanceolate, 3.5 mm. long, acuminate, embracing the lemma, 5-nerved, these being present as ribs on the dorsal surface and bear hooked spines. *Lemma* ovate-lanceolate, just over 2 mm. long, puberulous, embracing a narrowly oblong palea and a bisexual flower. *Stamens* 3. *Styles* 2. *Lodicules* 2. *Grain* linear, oblong, free within the lemma and palea.

A xerophytic species found in GOALPARA.

13. PHALARIDEÆ.

Annual or perennial herbs; leaf-blades narrow; spikelets alike, hermaphrodite, mostly strongly laterally compressed, 3-flowered with the lower 2 flowers male or barren and terminal floret hermaphrodite, arranged in open or contracted sometimes spike-like panicles; rhachilla disarticulating above the glumes and not between the florets, not or rarely produced beyond the upper floret; glumes persistent, equal and as long as the spikelet, or the lower or both shorter, membranous to chartaceous; lower two lemmas longer than the third or smaller, in some cases reduced to minute scales, awnless or awned from the back or tip; terminal lemma awnless; lodicules 2 or 0; stamens 2 to 6.

Key to the genera of *Phalarideæ*.

Spikelets sub-terete.	..	..	1. <i>Anthoxanthum</i> .
Spikelets more or less flattened :—			
Lower lemmas scale-like.	..	..	2. <i>Phalaris</i> .
Lower lemmas well developed.		..	3. <i>Hierochloe</i> .

1. *ANTHOXANTHUM* Linn.

Spikelets oblong to narrow-lanceolate, slightly laterally compressed; rhachilla disarticulating above the upper glume not produced beyond the uppermost floret. *Florets* three, heteromorphous, the lower two male or barren, the terminal hermaphrodite. *Glumes* persistent, 1-3-nerved, keeled, acuminate; upper longer. *Lower* two lemmas equal and very similar, oblong, emarginate, membranous, strongly laterally compressed, 5-7-nerved, keeled, hairy, awned; awn of the lower lemma short from one-third to one-half way below the tip; of the upper longer, kneed, from near the base, rarely from the middle; terminal lemma much shorter than the lower two. broadly elliptic, very thin, delicately 7-1-nerved. *Palea* of the lower two florets, if present, 2-keeled, of the terminal 1-nerved. *Lodicules* 0. *Stamens* three in the male, two in the hermaphrodite florets. *Styles* distinct, long; stigmas long,

exserted from the top of the spikelet, plumose. *Grain* ovoid, slightly laterally compressed; hilum punctiform; embryo quarter the length of the grain.

Key to the species of *Anthoxanthum*.

Perennial.	..	..	..	1.	<i>A. odoratum</i> .
Annual.	..	..	..	2.	<i>A. aristatum</i> .

**1. *Anthoxanthum odoratum* Linn. Sp. Pl. (1753)
28.**

A perennial grass; stems tufted, erect, slender, 30-60 cm. tall; roots shallow; sheaths slightly keeled, somewhat striate, sparsely hairy or glabrous; blades lanceolate, thin, flat, 2-6 cm. long, 3-5 mm. wide, sparsely villous on both surfaces, rounded at the base; apex sub-acute; ligules truncate, membranous, hyaline, thin, up to 3 mm. long.

Inflorescence a spike-like panicle; branches short; spikelets oblong-lanceolate, acute, seated on short pubescent pedicels up to 7.5 mm. long. *Lower glume* ovate-lanceolate, acute, keeled, 1-nerved; nerve ending in a bristle; keel scabrid or ciliate. *Upper glume* 7.5 mm. long, ovate-acute, mucronate, keeled, 3-nerved. *Lowest floret* barren; lemma 2.7 mm. long, hyaline, appressed pilose with golden hairs, bifid at the top, lobes obtuse, erose; a short awn issues from the median nerve just below the top; palea absent. *Middle floret* barren; lemma 2.5 mm. long, of the same shape and texture, long awned from the base; awn 10 mm. long, twisted below, geniculate. *Upper floret* hermaphrodite; lemma broadly ovate, wrapped round the palea, shining, 2 mm. long, 1-nerved, sub-keeled: palea narrower, slightly shorter; margins incurved, obtuse, glabrous. *Styles* 2; stigmas 2, very long, issuing from the top of the spikelet. *Stamens* 2.

Introduced from EUROPE and run wild in Shillong.

**2. *Anthoxanthum aristatum* Boiss. Voy. Bot. Esp.
2. (1839) 638.**

Differs from *Anthoxanthum odoratum* Linn. in being an annual with lower culms, often geniculate and bushy branching; panicles looser; spikelets a little smaller.

Introduced into Shillong with grass seed from southern EUROPE and run wild.

2. PHALARIS Linn.

Spikelets laterally compressed in contracted, more or less spike-like, panicles; rhachilla disarticulating above the glumes, not or obscurely produced beyond the terminal floret. *Florets* 3; the lower 2 minute, rudimentary, the uppermost hermaphrodite, enclosed by the glumes. *Glumes* sub-equal, boat-shaped, keeled; keel often winged. *Empty lemmas* very small, subulate to lanceolate, membranous, with a callous base, or one or both reduced to a minute callous scale; fertile lemma thin, ultimately rigid, 5-nerved, awnless, ovate, acute. *Palea* almost as long as the lemma, 2-nerved, sometimes obscurely. *Lodicules* 2; hyaline. *Stamens* 3. *Styles* long, distinct; stigmas plumose, exerted from the top of the spikelet. *Grain* much compressed, ovate, free, enclosed by the lemma and palea; hilum oblong, short; embryo equalling quarter the length of the grain.

Phalaris arundinacea Linn. Sp. Pl. (1753) 55.

A perennial grass; rhizome short, praemorse, stoloniferous; stolons with firm scarious sheathing scales; culms erect from a creeping or ascending base 60-100 cm. long, rooting at the lower nodes, simple or very sparingly branched, firm, glabrous, finely striate, 5-7- or more-noded, internodes gradually longer from the base up to 25 cm. long; sheaths glabrous, smooth, strongly striate; lower tight, longer than the internodes; upper looser, shorter; ligule scarious, white, obtuse, 3-7.5 mm. long; blades linear to linear-lanceolate, long tapering, 15-30 cm. long by 7-20 mm. wide, rigid, glaucous, glabrous, smooth, many-nerved.

Panicle erect, sometimes nodding, contracted, lobed or spike-like, up to 20 cm. long; branches very short, adpressed to the rhachis or longer (up to 3 cm.) and more or less spreading, copiously and densely branched, glabrous, smooth or scabrid; spikelets ovate-lanceolate, 6.5-15 mm. long; glumes sub-equal, whitish-green, acute, three nerved; keel not or very obscurely winged, minutely serrulate, nerves

raised; empty lemmas sub-equal, lanceolate to subulate obscurely 1-nerved or nerveless, hairy with a callous base, 1·8 mm. long; fertile lemma scantily silky 3·7 mm. long; palea ciliate on the back; lodicules obliquely ovate-lanceolate; anthers 3·5 mm. long.

Introduced into Shillong as an ornamental grass in the form var. *picta*. Has now spread in and about Shillong and as far as 16 miles outside. The escaped grass does not show the varietal characters of var. *picta*, but has reverted to the ordinary type with green leaves.

3. HIEROCHLOE Gmelin ex R. Br.

Spikelets with one perfect terminal floret and below it two male or neuter florets; the whole plexus hermaphrodite and the two male or neuter florets all falling together owing to the disarticulation of the rhachilla above the two equal or sub-equal, 3-nerved, broad, thin, papery smooth and acute glumes; staminate or neuter lemmas about as long as the glumes, boat-shaped, hispidulous, hairy along the margins; fertile lemmas somewhat indurate about as long as the others, smooth or nearly so, awnless; rhachilla not produced above the upper floret; palea 3-nerved, rounded on the back.

Perennial erect, slender, sweet smelling grasses with small panicles of broad bronze or purple coloured spikelets.

Key to the species of *Hierochloe*.

Glumes unequal.	..	..	..	1.	<i>H. gracillima</i> .
Glumes sub-equal.					
Spikelets 3 mm. long.	..	..	..	2.	<i>H. khasiana</i> .
Spikelets 5 mm. long.	..	..	..	3.	<i>H. clarkei</i> .

1. *Hierochloe gracillima* Hook. f. in F. B. I. VII (1897) 223.

An annual grass. *Culms* weak, up to 30 cm. tall, smooth and glabrous. *Leaf-blades* up to 10 cm. long, 1·2 mm. broad, flaccid, scabrid on the margins, with few villae at the base; sheaths long, striate, smooth and glabrous, often falling from the stem; ligule membranous, 2 mm. long, erose.

Inflorescence a contracted panicle 2·5-5 cm. long, 1 cm. broad; branches short on a minutely scabrid angled axis. *Spikelets* erect, shortly pedicelled, 5·5 mm. long. *Lower*

glume 3 mm. long, 1-nerved, margins scarious, scabrid on the keel; upper glume 5.5 mm. long, 3-nerved, scarious on the margins, scabrid on the keel, minutely mucronate. *Lowest floret* neuter; lemma 5 mm. long, sparsely hairy, shortly bifid, shortly awned in the sinus, epaleate. *Middle floret* neuter; lemma 5 mm. long, obscurely 2-toothed, awn nearly basal about 9 mm. long, recurved. *Upper floret* hermaphrodite; lemma scarious; palea 1-nerved. *Stamens* 3.

Pankim La, 9,000 ft. BALIPARA FRONTIER TRACT.

2. Hierochloe khasiana C. B. Clarke ex Hook. f. F.B.I. VII (1897) 223.

A perennial grass. *Culms* up to 80 cm. erect from a somewhat creeping base. *Leaves* 3-6 cm. long, up to 4 mm. broad, flat, linear, tapering gradually to a point, smooth and glabrous; *sheath* loose, smooth and glabrous; ligule a membranous, erose ridge.

Inflorescence a contracted panicle 4-6 cm. long, up to 1 cm. broad. *Spikelets* strongly laterally compressed, seated on pedicels 1.5 mm. long; rachis glabrous; pedicels sparsely hairy. *Glumes* sub-equal 3.5 mm. long, keeled, scabrid on the keel; first lemma empty, epaleate, 5-nerved, 3.5 mm. long, 2-lobed, sinus $\frac{1}{3}$ length of glume, centre nerve continued into a very short scabrid awn which does not reach the end of glume; dorsal surface covered with short brown appressed hairs; lobes hyaline glabrous; second lemma very similar, in this case, however, the scabrid awn does exceed the end of the glume. *Upper lemma* hermaphrodite; hyaline 2.5 mm. long. *Palea* narrow truncate, about 2 mm. long.

Shillong, 4,500 ft.

3. Hierochloe clarkei Hook f. in F.B.I. VII. (1897) 223.

Perennial. *Culms* up to 1 m., nodding. *Leaves* up to 30 cm. flat, linear, tapering to a fine point, scabrous above, scattered hairs beneath, undersurface glaucous; sheath smooth and glabrous, a few hairs on the margins; ligule a lacerate membranous ring sometimes 2 mm. in depth, ciliolate.

Panicle 5-10 cm. long up to 3 cm. broad. *Spikelets* 7 mm. long; terminal flower hermaphrodite above two empty lemmas, the lowest with a palea. *Lower glume* 5 mm. long, ovate, lanceolate, 1-nerved; the nerve ending in a point. *Upper glume* very strongly 3-nerved, 6·5 mm. long, minutely and distantly toothed on the upper half of the keel; first lemma 6 mm. paleate, empty, boat-shaped, 2-lobed, centre nerve produced into a short scabrid awn; margin ciliate; dorsal surface covered with short brown hairs; palea narrow, oblong, hyaline, ending in two teeth; second lemma 5·5 mm. long, oblong, 2-lobed, split $\frac{1}{3}$ way down the keel, a scabrid awn 9 mm. arises from low down on the dorsal surface of the lemma and not in the sinus as stated by Hooker; dorsal surface covered with short brown hairs, no palea; third lemma 3·5 mm. long, indurated, glabrous and smooth, lanceolate when flattened, convolute, seated on a 1 mm. prolongation of the hairy rhachilla.

KHASI & NAGA HILLS above 6,000 ft.

14. ORYZEÆ.

Annual or perennial herbs; leaf-blades narrow or rather broad; spikelets all alike and hermaphrodite, or more or less dissimilar and unisexual, apparently falling entire, 1- (rarely 3-) flowered, with the terminal floret hermaphrodite or unisexual and the lateral if present reduced to scale-like lemmas, pedicelled in open or contracted panicles, the unisexual spikelets with the sexes borne in different panicles on the same plant or in the same panicle, the female on the upper branches or at the ends of the branches, the male below them; rhachilla disarticulating below the floret or florets; glumes very minute or confluent into an annular rim or suppressed; sterile lemmas mostly shorter than the fertile floret or more often suppressed; fertile or male lemma membranous to coriaceous, awnless or with a straight awn from the tip, 3- to 9-nerved; palea 3- to 9-nerved; stamens 6, rarely 3, 2, or 1.

Key to the genera of *Oryzæ*.

Spikelets hermaphrodite.

Leaf-blades linear :—

Florets 3; the two lower sterile and reduced to the lemmas; fertile lemma coriaceous.

1. *Oryza*.

Floret 1; fertile lemma chartaceous.

2. *Leersia*.

Leaf-blades ovate-lanceolate to linear-oblong.

3. *Hygroryza*.

Spikelets unisexual.

Very tall reed-like grass.

4. *Zizania*.

1. ORYZA Linn.

Spikelets 3-flowered, only one fertile, arranged on the branches of an elongate panicle, the upper lemma articulated above the two lower sterile lemmas. *The glumes* are represented by obscure lips or scales at the apex of the peduncle. Two lower lemmas subulate, empty. *Fertile lemma* strongly laterally compressed, as long as the spikelet, coriaceous or papyraceous, hard, dimidiate-oblong, folded and keeled,

obtuse, acute or aristate, strongly 3-5-nerved; the lateral nerves forming a thickened margin; palea of the same texture as the lemma and as long, linear, 3-nerved, keeled; with membranous margins. *Lodicules* 2, entire or 2-lobed. *Stamens* 6, with slender filaments; anthers linear. *Ovary* with 2 styles and 2 laterally exerted stigmas. *Caryopsis* enclosed in the hardened lemma and palea and sometimes adnate to them.

Tall annual or perennial grasses with long narrow leaves.

Key to the species of *Oryza*.

Ligule elongated, at length splitting; spikelets

8-12.5 mm. long, annual :—

Spikelets persistent; awned or awnless. .. 1. *O. sativa*.

Spikelets deciduous; always awned. .. 1a. *var. fatua*.

Ligule short, truncate; spikelets 4-6 mm. long :—

Lemma hispid, awned. .. 2. *O. officinalis*.

Lemma smooth, awnless. .. 3. *O. meyeriana*.

1. *Oryza sativa* Linn. Sp. Pl. (1753) 333.

An annual grass. *Culms* up to 1.5 m. tall or more in the deep water varieties, rooting at the nodes, smooth; nodes glabrous. *Leaf-blades* flat, linear-acuminate, more or less scabrid below and on the margins, 30-60 cm. long, 6-8 mm. broad; sheaths smooth, with ciliate auricles, the lower without a limb, spongy; ligules long, scarious, lanceolate, finally splitting.

Inflorescence a lax erect panicle, finally nodding, 15-30 cm. long; rhachis rather robust, angled and channelled, scaberulous; pedicels angular, short, swollen at the top. *Spikelets* ovate-oblong or ovoid, erect, 8-12 mm. long, awned or not. *Lower lemmas* oblong-lanceolate, acute or subulate, entire or toothed at the top about 2 mm. long, empty. *Fertile lemma* as long as the spikelet, finely granulate, hispid-ciliate; awn short; palea acuminate, of the same texture as the lemma. *Caryopsis* oblong, angular, tightly enclosed in the lemma and palea.

Cultivated throughout the province in plains and hills.

1a. *Oryza sativa* var. *fatua* Prain in Beng. Pl. (1903) 1184.

An annual growing in water or swampy places. *Culms* up to 2 m. high, often with rootlets developing on the nodes below the water surface; stems spongy below. *Leaf-blades* flat 18-40 cm. long by 6 mm.-1 cm. broad, prominently nerved, linear, finally tapering to a point, margins very scabrid, main nerves scabrid on both surfaces; sheaths smooth, many-nerved, striate, markedly inflated at the base of the plant; ligule membranous, up to 1 cm. long, finally splitting.

Panicles effuse, at first erect, finally nodding, at first concealed within the spathe-like sheaths of the uppermost leaf. *Joints* of the panicle shortly bearded, branches and branchlets smooth or minutely scabrid; pedicels long or short, minutely scabrid. The top of the pedicels is expanded into an annular ring or into two minute scales which represent the glumes. First and second lemmas empty, similar, 1-nerved keeled, scabrid on the margin near the apex, lobed on both sides or not, about 2.5 mm. long. *Fertile lemma* with a conical callus, cymbiform very strongly compressed, coriaceous, oblong in profile, ridged on either side of the keel, markedly punctate, striate in two directions, sparsely hispid, coarsely scabrid on the keel and ridges, at the apex glandular, terminating in an awn which may be 7 cm. long or more; awn coarsely scabrid and jointed on the lemmas. *Palea* very similar to the lemma and as long or slightly longer. *Awn* sometimes purple while the spikelets are green.

Very common all over the province in wet and swampy places. The grain is edible and is eaten in times of want.

2. *Oryza officinalis* Wall. apud Prodröhl. in Mez, Bot. Archiv. I (1922) 224.

An annual or perennial grass with sub-woody roots. *Culms* tufted, erect, smooth and glabrous, with distant nodes, up to 2 m. in height. *Leaf-blades* finely acuminate from a narrow base, scaberulous on the surfaces and margins, rarely smooth, 30-60 cm. long by 1.25-3.5 cm. wide; median nerve

distinct; lateral nerves 17-19, sheaths long, ciliate in the throat, not swollen, margins smooth or ciliate; ligules very short, ciliate.

Inflorescence a spreading panicle. 12-30 cm. long : branches numerous, very long, the lower often verticillate 10-20 cm. long, very slender, hairy at the base, scaberulous; rhachis rigid, angular, grooved, scabrous; pedicels very short, slightly swollen at the tips. *Spikelets* oblong, sub-imbricate, 4-6 mm. long, aristate; lower lemmas small, entire, empty, ovate acuminate or subulate, the upper sometimes absent; fertile lemma deeply grooved, hispid-ciliate, finely reticulate, granular, granulation larger than in *O. sativa*, with an arista 2-3 times as long as the lemma, slender, flexuous, hispid; palea acuminate, of the same texture as the lemma; lodicules obovate, bipartite. *Style* divided to the middle, stigmas violet.

This grass appears under the name *O. latifolia* Desv., an American grass, in the Flor. Brit. India. VII.

Common in the plains of ASSAM.

3. *Oryza meyeriana* Baill. His. Pl. XII (1894) 166. Syn. *O. granulata* Nees et Arn. in Wight. Cat. No. 2354.

A perennial grass. *Culms* up to 1 m., slender, leafy, smooth. *Leaf-blades* flat, narrowly lanceolate, 7 cm.-15 cm. long by 1 cm. broad, hardly scabrid on the surface, scabrid along the margins, tapering to a fine point, somewhat cordate at the base, main nerves very prominent below, somewhat glaucous in colour; sheaths rather inflated below, papery, smooth, margins scarious, with a tuft of stiff hair on the collar, just at the insertion of the leaf-blade; ligule a narrow membranous ring.

The inflorescence is a simple raceme; rhachis flexuous, smooth, spikelets 4-6 mm. long, seated on short pedicels, awnless. *The glumes* are represented by the expanded top of the pedicel which projects as two minute ledges. *Lower lemmas* empty, minute or absent altogether; when present 1 mm. long, lanceolate smooth and glabrous. *Upper lemma* 5-5.5 mm. long, glabrous, conspicuously granulate, cymbiform, awnless; apex truncate and suggestive of the articula-

tion of an awn; palea similar in shape and texture. *Stamens* 6. *Ovary* glabrous.

NOWGONG & SIBSAGAR.

2. LEERSIA Swartz.

Spikelets strongly laterally compressed, pedicelled on the branches of a slender panicle, rhachilla disarticulating above the rudimentary glumes. *Floret* one, hermaphrodite. *Glumes* reduced to a very obscure, often 2-lobed rim. *Lemma* boat-shaped, compressed and keeled, with the keels and margins rigidly ciliate, awnless, 5-nerved, becoming hardened at maturity. *Palea* as long as the lemma, narrow, keeled with the keel rigidly ciliate, 3-nerved, tightly embraced by the margins of the lemma. *Lodicules* 2. *Stamens* 6, 3 or 1. *Grain* compressed, free between the lemma and palea. Perennial aquatic grasses with narrow leaf-blades.

Leersia hexandra Sw. Prodr. Veg. Ind. Occ. (1788)
21.

An aquatic perennial grass. *Culms* forming dense masses at the margins of swamps or lakes, 60-120 cm. long, slender, smooth, striate, somewhat compressed, simple or branched; nodes hairy. *Leaf-blades* erect, flat, rigid, glaucous in colour, linear, acuminate, 7-20 cm. long, 4-10 mm. broad, scabrid on the margins; sheaths scaberulous or smooth, glabrous apart from the nodes.

Inflorescence an erect terminal panicle, slender, contracted, 5-10 cm. long, of a few branches; axis and branches flexuous; branches 2-3 cm. long, erect or spreading few-spiculate; pedicels very short. *Spikelets* closely imbricate, oblong, compressed, 3-4 mm. long, concave-convex in profile. *Glumes* reduced to a rim at the apex of the pedicel. *Lemma* 3-4 mm. long, dimidiate-oblong, cartilaginous, 5-nerved, the lateral nerves forming a thick border, compressed laterally, with the keel rigidly ciliate, lateral nerves very scabrid; palea hardly shorter, dimidiate, linear-oblong, 3-nerved, grasped by the margins of the lemma, ciliate on the keels. *Lodicules* 2. *Stamens* 6. *Ovary* glabrous. Caryopsis glabrous, hardly enclosed by the lemma and palea.

Very common in swamps and bhils up to 4,000 ft. This grass is said to provide a good fodder.

3. HYGRORYZA Nees.

Spikelets few, lanceolate, 1-flowered, shortly pedicelled, arranged on the spreading branches of a short, broad panicle. *Glumes* absent. Lemma papyraceous, lanceolate, tapering into a long awn, 5-nerved, keel and nerves ciliate; palea acuminate, 3-nerved, keel scabrid. *Lodicules* 2, gibbous. *Stamens* 6, with long, linear anthers. Styles short, free; stigmas laterally exserted. *Grain* narrowly oblong, free within the lemma and palea.

Hygroryza aristata Nees in Edinb. New Phil. Journ. XV (1833) 380.

A floating grass. *Culms* 30-60 cm. long, spongy, glabrous, flexuous, branching, leafy to the panicle, rooting below with numerous capillary rootlets. *Leaf-blades* ovate-oblong or ovate-lanceolate, firm, obtuse at the apex, rounded or cordate at the base, 2.5-8 cm. long, by 8-18 mm. broad; sheaths broad, compressed, smooth; ligule absent or membranous.

Inflorescence a triangular panicle 5-8 cm. long; branches few, spreading, short, slender, smooth; pedicels with a red annulus below the middle. *Spikelets* few in number, solitary, articulate, but tardily deciduous, narrowly lanceolate, 7-8 mm. long, 1-flowered. *Glumes* absent. Lemma papyraceous, lanceolate-acuminate, 5-nerved, often hairy between the nerves; nerves scaberulous, awned; awn as long as the lemma; palea similar in texture to the lemma and as long but narrower, 3-nerved, keels scabrid or ciliate. *Stamens* 6. *Caryopsis* narrowly oblong, free within the lemma and palea.

A floating grass forming mats on the surface of the water. This grass is said to be relished by cattle.

4. ZIZANIA Linn.

Spikelets unisexual, 1-flowered, disarticulating from the pedicel; glumes obsolete, represented by a small collar-like ridge; pistillate spikelet terete, angled at maturity; lemma

chartaceous, 3-nerved, tapering into a long slender awn; palea 2-nerved, closely clasped by the lemma; grain cylindric, 1-2 cm. long. *Staminate* spikelet soft; lemma 5-nerved, membranous, linear, acuminate or subulate; palea about as long as the glume, 3-nerved; stamens 6.

Tall aquatic annuals or perennials, with flat blades and large terminal panicles, the lower branches spreading or ascending, bearing pendulous staminate spikelets, the upper branches ascending, at maturity erect, bearing appressed pistillate spikelets; the staminate spikelets early, the pistillate tardily deciduous.

Zizania latifolia (Griseb.) Turcz. Bull. Soc. Nat. Mosc. (1838) 105.

An aquatic perennial with well-developed stolons and rhizomes. *Culms* erect, glabrous, very thick and spongy below, slender above. *Leaves* coriaceous, flat, linear-lanceolate, tapering to a fine point, 30-100 cm. long, 2-3 cm. broad, rough on the surfaces, thickened and scabrid on the margins; sheaths loose, glabrous, striate; ligules well-developed, ovate.

Inflorescence a narrow panicle, 30-50 cm. long with a robust axis; branches numerous, erect or the lower spreading; the lower bearing male spikelets; the upper branches carrying female spikelets seated on pedicels 3 mm. long which are much swollen at the top and shortly ciliate-dentate. *Spikelets* disarticulating from the pedicels, linear oblong, the male 8-12 mm. long, the female 15-17 mm. long, both measurements not including the awn. *Glumes* absent. Male spikelets; lemma oblong, membranous, scaberulous at the top; awn 8-10 mm. long; palea membranous about as long as the lemma; stamens 6 with short filaments and obtuse anthers. Female spikelets; lemma membranous oblong, very ciliate and scabrid at the top; awn up to 20 mm. long; palea as long as the lemma; scabrid and ciliate above; ovary with long, laterally exserted, feathery stigmas.

This grass was found by Meebold in the Logtak lake in MANIPUR where it is doubtless a valuable food plant for the immense numbers of wild fowl which migrate there in the cold weather. The thickened bases of the culms are said to be used as a vegetable.

15. THYSANOLAENEÆ.

Perennial grasses; culms usually tall, solid; leaf-blades broad, many-nerved; spikelets very small, all alike, 2-flowered with the lower floret barren and reduced to the lemma and the upper floret hermaphrodite, falling with part of the pedicel from the branches of large, much-divided panicles; rhachilla tardily disarticulating above the glumes and between the florets, produced beyond the upper floret and sometimes bearing a rudimentary floret; glumes obtuse, up to half the length of the spikelet, nerveless; lower lemma as long as the spikelet, acuminate, 1- to 3-nerved, thinly membranous; upper lemma slightly shorter than the lower, acuminate or mucronate, becoming slightly hardened, 3-nerved, margin fringed with hairs; palea shorter than the lemma; stamens 2 or 3; grain free between the lemma and palea.

Thysanolæna maxima O. Ktze. Rev. Gen. Pl. (1891) 794, Syn. T. agrostis Nees, in Edinb. New Phil. Jour. XVIII (1835) 180.

A perennial grass. *Culms* 1·5-3·5 m. tall, rounded, hard, glabrous. *Leaves* numerous, coriaceous, broadly lanceolate, acuminate, sub-amplexicaul, flat, glaucous below, 30-60 cm. long, 5-10 cm. broad, scabrid on the margins; sheaths tight, hard, shining and very glabrous, except towards the throat; ligules cartilaginous, very short, truncate.

Inflorescence a very large, soft panicle 30-60 cm. long, glabrous, made up of many erect to sub-erect, filiform branches, which divide and sub-divide into very numerous branchlets which are covered with innumerable, minute spikelets. *Spikelets* 2-flowered, ovoid-lanceolate, acuminate, pedicellate, 1·2-1·6 mm. long; rhachilla shortly produced as a short stipe ·5 mm. long. *Glumes* sub-equal, about ·75 mm. long, ovate, sub-acute, hyaline, obscurely 1-nerved. *Lower floret* barren: lemma lanceolate, acuminate, membranous, glabrous,

epaleate, 1-nerved. *Upper floret* hermaphrodite ovate, acute, ciliate with long erect white hairs; palea short, truncate. *Stamens* 2-3; anthers short. *Styles* free. *Grain* very minute free.

A very common grass up to 4,000 ft. The panicles are often used for making brooms.

16. ARUNDINELLEÆ.

Spikelets all alike, 2-flowered with the lower floret male or barren and the upper hermaphrodite, pedicelled in open or contracted, rarely spike-like panicles; rhachilla disarticulating between the florets, not produced above the upper floret; glumes more or less persistent, mostly acute or acuminate, membranous to coriaceous, the lower shorter, the upper as long as the spikelet; lower lemma similar to the upper glume, 3-9-nerved; upper lemma more or less terete, smaller than the lower, becoming 3-9-nerved, frequently awned from the entire or two-lobed tip, the awn usually geniculate and twisted below the knee, rarely awnless, often with a bearded basal callus; stamens 2 or 3; caryopsis tightly enclosed between the lemma and palea.

Annual or perennial herbs; leaf-blades linear to lanceolate.

Tropical and sub-tropical regions.

Key to the genera of *Arundinelleæ*.

Lemma of the upper floret scabrid or scaberulous, entire or minutely 2-lobed at the apex, lobes awned or awnless. ..

1. *Arundinella*.

Lemma of the upper floret bearded below the 2 lateral prominent lobes.

2. *Danthoniopsis*.

1. ARUNDINELLA Raddi.

Spikelets lanceolate to ovate or ovate-elliptic or oblong, usually gaping, unequally pedicelled, continuous with or imperfectly jointed on the slender branches of open or contracted panicles; rhachilla glabrous readily disarticulating between the florets, and very slowly disarticulating or continuous between the upper glume and lower floret, not produced beyond the upper floret. *Florets* 2, hetermorphic; lower male or barren, very rarely hermaphrodite; upper hermaphrodite smaller than the lower. *Glumes* persistent, narrowly lanceolate to ovate or ovate-elliptic, acute or acuminate, membranous to chartaceous, 3-5-nerved, lower small-

er, mostly half to $\frac{3}{4}$ the length of the spikelet, upper as long as the spikelet. *Lower* floret sub-persistent; lemma ovate-oblong to oblong, obtuse or acute, sub-equal to the lower glume, thin, 3-7-nerved; palea narrow 2-keeled, from $\frac{1}{3}$ the length of, to as long as the spikelet. *Upper floret* narrow lanceolate to lanceolate-oblong, sub-terete or dorsally compressed, with a very short obtuse or truncate bearded or glabrous basal callus; lemma membranous, at length thinly coriaceous, finely 1-7-nerved, scabrid or scaberulous, entire, emarginate or minutely 2-lobed at the apex, with the lobes muticous or each bearing a capillary bristle, awned from the tip or the sinus of the two lobes or awnless; awn straight or curved or geniculate and twisted below the bend; palea narrow, 2-keeled, with the flaps more or less auricled. *Lodicules* 2, cuneate. *Stamens* 3. *Ovary* glabrous, styles distinct, stigmas plumose, laterally exserted. *Grain* oblong or ellipsoid, slightly dorsally compressed, tightly embraced by the lemma and palea; hilum punctiform; scutellum half the length of the grain or more.

Perennials or annuals; culms simple or branched; leaf-blades linear to lanceolate, usually flat; ligules very short, truncate; panicles usually rather stiff; spikelets .2 mm. to 1 cm. long, green, greyish, straw-coloured or purplish.

Key to the species of *Arundinella*.

Lobes of upper lemma bearing short capillary bristles :—

Spikelets 5-6 mm. long, panicle loose, central branches not verticillate. 1. *A. setosa*.

Spikelets 6-8 mm. long, crowded, usually covered with bulbous-based hairs, central branches verticillate. 2. *A. khaseana*.

Lobes of upper lemma without bristles :—

Fertile lemmas awned :—

Annual; spikelets 1.8-2 mm. long, leaf-blades lanceolate. 3. *A. pumila*.

Perennials :—

Spikelets villous; rhachis and branches densely villous; panicles narrow. 4. *A. villosa*.

Spikelets not villous; rhachis and branches not villous :—

Panicles contracted; rhachis long ciliate. 5. *A. intricata*.

Panicles effuse, rhachis often scabrid :—

Rhachis of panicle angular, scaberulous glabrous; roots tuberous, not woolly.

6. *A. nepalensis*.

Rhachis of panicle filiform, scaberulous; roots tuberous, densely woolly.

7. *A. mutica*.

Fertile lemmas unawned, or only slightly so :—

Branches of panicle 2·5-4 cm. long, short, stiff, spiciform.

8. *A. bengalensis*.

Branches of panicle 8-20 cm. long; very tall reed-like grass with long leaves. ..

9. *A. decempedalis*.

1. *Arundinella setosa* Trin. Gram. Panic. (1826) 63.

A perennial grass. *Culms* 60 cm. to 1 m. tall, smooth, glabrous, erect, from an almost woody rootstock, densely tufted; nodes smooth, glabrous, exserted from the leaf-sheaths. *Leaf-blades* narrow, up to 20 cm. long by 6 mm. wide, involute or sometimes flat-linear, tapering to a point, many-nerved, both surfaces hirsute-tomentose, margins minutely scabrid; sheaths rather loose, lower often persistent, coarsely hirsute with white or reddish hairs often from tubercle-bases, sometimes quite glabrous; ligule a narrow ring of very short dense, stiff hairs.

Inflorescence a loose panicle, lax, few branched, up to 15 cm. long, branches 5-12 cm. long, usually naked below; glabrous, smooth or very minutely scabrid. *Spikelets* 6·5-7·5 mm. long, seated on short or long pedicels, often paired, minutely scabrid. *Lower glume* 4 mm. long, ovate-acuminate, 3-nerved; nerves anastomosing below the tip, centre nerve prominent and produced into a short mucro, glabrous and smooth, or with a few hairs. *Upper glume* 6 mm. long, 5-nerved, ovate-lanceolate, tip blunt or sharp, glabrous and smooth. *Lower floret* male; lemma ovate-lanceolate, 5-6-7-nerved, glabrous, almost enclosing the upper floret; palea lanceolate, hyaline, 2-keeled, margins infolded. *Stamens* 3, anthers 1·5 mm. long. *Upper floret* hermaphrodite, bearded on the callus; lemma 3 mm. long, 5-nerved, delicate setose up to 2·25 mm. long, lobes two, short, awn 8 mm. (or longer).

Common on the Shillong plateau. 5,000 ft.

2. Arundinella khaseana Nees ex Steud. Syn. Pl. Glum. (1854) 115.

A perennial. *Culms* robust, up to 2 m. tall, almost solid below; internodes smooth and glabrous or hairy and scabrid; nodes densely bearded or almost glabrous. *Leaf-blades* flat, or convolute, rather rigid, rough, margins serrulately-scabrid, glabrous or hirsute; sheaths smooth or scabrid, glabrous, striate, rather loose, or hirsute, margins very hairy; ligule a ridge of hairs.

Inflorescence a panicle, effuse, contracted or thyrsiform, 15-30 cm. long; rhachis stout, angled, scabrid to hirsutely scabrid, pedicels stout. *Spikelets* numerous or few, 7 mm. long. *Lower glume* lanceolate, 5-nerved, sparsely hairy on the nerves with long tubercle-based hairs; upper glume 6-7 mm. long, lanceolate, 5-nerved, with tubercle-based hairs on the nerves. *Lower floret* male, 6 mm. long, ovate-lanceolate, margins clasping the base of the upper floret, 5-nerved, glabrous; palea hyaline, ovate-oblong, 2-keeled, margins incurved. *Upper floret* hermaphrodite, callus bearded, ovate-oblong, 2-lobed, with the lobes continued into short aristae, 7-nerved, awned from the sinus, awn 6 mm. long, upper half scabrid lower smooth, strongly keeled; palea as long as the lemma, 2-keeled; margins ciliate. *Stamens* 3; anthers 2.25 mm., linear.

Very common in the KHASI & JAINTIA HILLS beside water courses or in dry situations. Normally flowers in August but has been found in flower in April-May.

Very common about Shillong, 5-6,000 ft.

3. Arundinella pumila Steud. Syn. Pl. Glum. (1854) 114. Syn. *A tenella* Nees ex Steud. Syn. Pl. Glum. (1854) 115.

A very slender annual. *Culms* up to 45 cm. long, prostrate or geniculately ascending, simple, smooth and glabrous or sparsely hairy, pubescent on the nodes. *Leaf-blades* lanceolate, contracted at the base and tapering to a fine point, up to 15 cm. long by 7.5 mm. wide, flaccid, glabrous or sparsely hairy; sheaths glabrous or sparsely pubescent; ligule short, hairy.

Inflorescence a very large, copiously branched panicle 5-25 cm. long; rhachis with scattered white hairs; branchlets and pedicels capillary, the latter up to 10 mm. long, usually much shorter. *Spikelets* ovate-acute in shape, pale green in colour, 2-2.5 mm. long. *Lower glume* 1.25-1.6 mm. long, ovate-acuminate, 3-nerved; upper glume 2.5 mm. long, 5-nerved. *Lower floret* male or rarely hermaphrodite; lemma 1.6-1.8 mm. long, glabrous, thinly membranous, 3-nerved. *Upper floret* hermaphrodite; lemma 1.25 mm. long, minutely scaberulous, 1-nerved, minutely 2-lobed; awn up to 3 mm. long.

Collected by C. B. Clarke near Umswai, KHASI & JAINTIA HILLS, 3-5,000 ft.

4. *Arundinella villosa* Arn. ex Steud. Syn. Pl. Glum. (1854) 115.

A densely tufted perennial. *Culms* slender sometimes stout, up to 45 cm. high, smooth, glabrous except below the panicle, leafy below. *The leaf-blades* are usually flat, strict rather rigid, sometimes involute or convolute, and may be glabrous tomentose or villous; sheaths rather loose, often densely tomentose, rarely glabrous, margins usually hirsute. *Ligule* a ridge of hairs varying greatly in length.

Inflorescence a contracted panicle consisting of short spiciform branches, upon which are borne a number of closely crowded spikelets seated upon short pedicels; rhachis and branches are either villous or hirsute; pedicels very hairy. *Spikelets* 6 mm. long shortly awned. *Lower glume* 5 mm. long, lanceolate, 5-nerved, with a number of tubercle-based hairs on the dorsal surface on the central 3 nerves, rarely as well on the outer two. *Upper glume* lanceolate-acuminate, 5-7-nerved, a number of hairs are borne on the nerves. *Lower floret* male; lemma membranous, 5.5 mm. long, 5-nerved, oblong-lanceolate, the central nerve continued into a blunt mucro; palea hyaline, margins infolded and lobed. *Upper floret* hermaphrodite, callus hairy at the base; lemma oblong-lanceolate, 3 mm. long, scaberulous on dorsal surface, broadly ovate-lanceolate, involute, awn 4.5 mm. long, scabrid to the

base, the lemma in shortly cleft and very shortly 2-lobed; palea as long as the lemma, indurated, involute with flaps.

Khasya is quoted as one of the habitats of this plant, but I have not been able to find any specimens at Kew. If it does exist it will be found between 3,000 and 4,000 ft.

5. *Arundinella intricata* Hughes in Kew Bull. (1920) 112.

A perennial grass. *Culms* 30-60 cm. tall from a geniculate base, densely caespitose, tall, strict, glabrous, 4 to 10-noded. *Leaf-blades* linear, drawn out to a fine point, 5-2·2 cm. broad, flat or involute, rigid or flaccid, glabrous or sometimes sparsely hairy on the upper surface; scabrid on the margins. *Leaf-sheaths* firm, striate, margins densely ciliate, the lower persistent; ligules very short, truncate, sometimes very densely fringed on the back.

Panicle oblong or ovate, contracted, 6·5-12·5 cm. long, 1-2 cm. broad; primary axis is angled and grooved, very conspicuously ciliate on the angles; branches solitary or 2-nate. *Spikelets* gaping, 4 mm. long; lower glumes ovate-acuminate, sometimes setaceous acuminate, 3 mm. long, distinctly 3-5-nerved; upper glume ovate, acute or acuminate, apex slightly recurved, 4 mm. long, 5-nerved. *Lower floret* male, very rarely female or hermaphrodite; lemma ovate, acute or acuminate, 4 mm. long, 5-nerved; palea ovate-oblong, acute, 3 mm. long; the lower part of the keels winged and the upper scaberulous. *Anthers* 1·5 mm. long. *Upper floret* hermaphrodite; lemma oblong, bifid, with an awn as long as or longer than the lemma; column short, chartaceous, minutely scaberulous; palea narrowly ovate, 2 mm. long, scabulous between the keels.

This grass is related to *A. nepalensis* Trin., but differs from it in its more or less contracted panicle, by the angles of the rhachis being plainly and definitely ciliate, by the lower glume being abruptly acute.

MISHMI, KHASI & NAGA HILLS, 4-6,000 ft.

6. *Arundinella nepalensis* Trin. Diss. II. 62. Syn. A. brasiliensis of F.B.I. VII (1897) 73 non Raddi.

This is a perennial grass and so variable that it is almost

impossible to give characters by which it may be known. The root-stock is hard and woody, creeping and sending out stout sheathed branches. The height of the culm varies from 30 cm. to 2 m. and may be stout and reed-like or very slender, smooth and glabrous, or hairy and scabrid, striate; nodes usually glabrous. *Leaves* flat, 15-30 cm. long, from 4 mm. to 1·8 cm. broad, flat, often involute, surface of the leaf often villous with long soft tubercle-based hairs, occasionally nearly glabrous with many longitudinal nerves and also cross nerves; sheaths somewhat loose, varying from hirsute, villous to almost glabrous; margins hirsute, with a tuft of hairs at the collar; ligule a ring of long or short, soft hairs.

The panicle varies from 10 cm.-45 cm. in length, the branches may be few to many, short or long, loosely spreading or contracted. *Spikelets* are distant or crowded, 3-4 mm. long; rachis and pedicels (long or short) are always more or less scabrid, and occasionally a few hairs like an involucre spring from the top of the pedicel. *Lower glume* 2·5 mm. long, ovate-lanceolate, 3-4-nerved, scabrid on the nerves; upper glume ovate-lanceolate, upper half strongly compressed, 5-nerved; smooth and glabrous. *Lower floret* male; lemma lanceolate, 5-nerved, ciliate on margins near apex; palea 2·5 mm. long, margins involute and lobed, fringed with long cilia; upper floret hermaphrodite; lemma 2 mm. long, ovate, truncate, obscurely 3-nerved, two obtuse lobes at apex, hairy in the callus, awn 3 mm. long, lemma very scabrid on the dorsal surface. *Palea* narrow-lanceolate, almost as long as the lemma, ciliate. *Stamens* 3, anthers 1·5-1·76 mm. purple.

The extreme forms of this plant look like distinct species but all intermediate stages are to be found.

A very common grass all over the province in hills and plains.

7. *Arundinella mutica* Nees ex Steud. Syn. Pl. Glum. (1854) 116. Syn. *A. capillaris* Hook. f. in F. B. I. VII (1897) 74.

A perennial grass. *Culms* very slender, erect from a tuberous rhizome clothed with the woolly bases of the leaf-

sheaths; nodes glabrous. *Leaf-blades* 15-30 cm. long, 4-8 mm. wide, linear, acuminate, tapering to the base, glabrous or hairy; ligule a ridge of hairs.

Inflorescence an oblong panicle, 10-18 cm. long; rhachis filiform, scaberulous; branches alternate, slender, 10-15 cm. long. *Spikelets* 4-5 mm. long, glabrous, solitary or in pairs; pedicels long, capillary, angular. *Lower glume* 3.2 mm. long, ovate, acute, 3-nerved, tapering to a long slender mucro, scabrid on the keel; upper glume up to 5 mm. long, ovate-lanceolate, 5-nerved; tip cuspidate-acuminate. *Lower floret* male; lemma 3-4 mm. long, ovate-oblong, subacute, 3-nerved; palea as long as the glume, oblong-lanceolate, acute, hyaline. *Upper floret* hermaphrodite; lemma as long as the lower lemma, lanceolate, acute, scaberulous; palea oblong-lanceolate, acute; awn nearly 6 mm. long, caducous.

Plains of LAKHIMPUR & SIBSAGAR.

8. *Arundinella bengalensis* Druce, Rep. Bot. Exchg. Club. Brit. Isles. (1916) 605. Syn. *A. wallichii* Nees ex Steud. Syn. Pl. Glum. (1854) 114.

A perennial grass. *Culms* stout, erect, up to 1 m. tall, often almost solid, smooth and glabrous, nodes glabrous or bearded. *Leaves* 30-45 cm. long, flat, lanceolate-acuminate; surface glabrous to villous with hairs from tubercle bases; margins minutely scabrid or not; sheaths loose, very hairy or not outside, persistent below, often hairy on the margins; ligule a ridge of long or short hairs, often supplemented by a tuft of stiff hairs in the throat.

The inflorescence consists of an elongate, erect, strict panicle; branches 2.5-3 cm. long, stout, spiciform. *Spikelets* 3-4-seriate, ovoid, secund, densely imbricate, stoutly pedicelled, setose; panicle up to 30 cm. long; rhachis angled and scabrid. *Lower glume* 2.5 mm. long, ovate-acute, 3-nerved, scabrid on the nerves; upper glume 3 mm. long, broadly lanceolate, 5-nerved, often hairy on the nerves. *Lower floret* male; lemma oblong-obtuse, 5-nerved; palea narrowly oblong, hyaline. *Upper floret* hermaphrodite; lemma 2 mm. long, callus very shortly bearded, scabrid, very obscurely 3-nerved,

almost ovate, apex abruptly narrowed into a short awn, 1.5 mm. long. *Stamens* 3, anthers 1.5 mm. long.

A very common grass in the plains and upto 6,000 ft.

9. *Arundinella decempedalis* (O. Ktze.) Janowski in Fedde, Rep. Spec. Nov. XVII (1921) 84. Syn. *A. clarkei* Hook f. in F. B. I. VII (1897) 75.

A tall, stout, reed-like perennial grass. *Culms* erect, up to 2 m. or more, by 2 cm. in diameter, smooth and glabrous. *Leaves* long, up to 1 m., by 2-4 cm. broad, lanceolate, flat, midrib very strongly marked; surface hispid or coarsely scabrid; margins finely scabrid; a tuft of long coarse hairs in the throat; sheath loose, somewhat inflated, perfectly smooth and glabrous; margins fimbriate; ligule a membranous ridge, supplemented by hairs.

The inflorescence is a large panicle up to 45 cm. long by 15 cm. broad; central axis smooth; branches rarely divided, often verticillate below, filiform, scaberulous; the lateral branches often exceeding 25 cm. in length. *Lower glume*, ovate-lanceolate, rather firm, 3 mm. long, 3-nerved, scabrid on the nerves; upper glume 3.75 mm. long, ovate-lanceolate, 5-nerved. *Lower floret* male; lemma broadly ovate-lanceolate, 5-7-nerved, tip obtuse, glabrous; palea 2.5 mm. long, hyaline, margins infolded, ciliate on the keels. *Upper floret* hermaphrodite; lemma 2 mm. long, callus bearded, ovate, somewhat obtuse at apex, nervation very obscure; palea narrow oblong, ciliate on the keels of the infolded margins. *Stamens* 3, anthers 1 mm. long, linear.

Plains of DARRANG.

2. DANTHONIOPSIS Stapf.

Spikelets lanceolate to ovate-lanceolate or lanceolate-oblong, paired or rarely in threes, pedicelled in open or contracted panicles; rhachilla glabrous, readily disarticulating between the upper glume and lower floret and between the florets, not produced beyond the upper floret. *Florets* 2; heteromorphous; lower male, upper hermaphrodite. *Glumes* persistent, scarious-membranous to chartaceous or rarely thinly coriaceous, 3-5-nerved, unequal; lower smaller

narrowly ovate to elliptic-ovate or elliptic-oblong, acute or obtuse, one-third to three-fifths the length of the spikelet. *Lower floret*; lemma similar to the upper glume, lanceolate to ovate-oblong, as long as or slightly shorter than the spikelet, 5-9- (rarely 3- or 11-) nerved; palea narrow, membranous, 2-keeled, with the keels very narrowly winged. *Upper floret* linear to oblong, slightly dorsally flattened or terete with a short bearded, very obtuse, truncate or 2-toothed basal callus; lemma membranous to coriaceous, 7-9-nerved, deeply bifid, with the lobes acute and sometimes produced into a fine scaberulous bristle, transversely bearded on the back either with a continuous beard beneath each lobe or with 6 to 8 distinct tufts of hairs, awned from the sinus between the two lobes; awn geniculate, twisted below the bend; palea similar to that of the lower floret, but the keels firmer and usually with wider wings, the wings usually bearing a lateral appendage at the apex. *Lodicules* 2, cuneate, fleshy. *Stamens* 3 in each floret; anthers linear. *Ovary* glabrous; styles distinct; stigmas plumose, laterally exserted. *Grain* oblong to obovate-oblong, grooved on one side; embryo up to half the length of the grain; hilum linear.

Perennial or annual grasses, culms simple, or branched towards the base; leaf-blades linear or lanceolate-linear, flat; ligule reduced to a fringe of hairs, panicle linear to oblong or ovate.

Danthoniopsis griffithiana Bor comb. nov. Syn. *Arundinella griffithiana* (C. Muell.) Bor in Ind. For. Rec. (Bot.) I. 3, (1938) 73; *Danthonia griffithiana* C. Muell. Bot. Zeit. XIV (1856) 348; *Arundinella avenacea* Munro ex Thw. Enum. Pl. Zeyl. (1864) 362.

A weak straggling slender grass. *Culms* up to 30 cm. high from a geniculate base, often decumbent for some distance, rooting at the nodes, finally erect, leafy to the top, often much branched; internodes smooth, somewhat hairy below the panicle; nodes glabrous. *Leaf-blades* flat, flaccid, cordate-amplexicaul below, tapering to a sharp point, many nerved, glabrous except for a few villae near the throat, up to 6 cm. long by 8 mm. broad; sheaths rather loose, glabrous,

striate, a few villae near the collar; ligule membranous, narrow, ciliate.

Inflorescence a compact ovate panicle; spikelets closely packed, seated on short, hairy, angled pedicels, sub-second on the branchlets; branches and branchlets angled, hairy. *Spikelets* 5-6 mm. long. *Lower glume* including the arista 4 mm. ovate-acuminate, 3-nerved, ending in a short antrorsely scabrid arista; a few tubercle-based hairs are scattered over the back; upper glume including the arista 4.5-5 mm. long, ovate-lanceolate, 3-5-nerved; nerves prominent in the upper half, less so below; arista antrorsely scabrid, 1.5 mm. long, a few hairs on the back. *Lower floret* male; lemma ovate-lanceolate, embracing the upper floret, glabrous, 3.5 mm. long, 3-nerved, crowned by a very short arista. *Palea* 2 mm. long, hyaline, 2-keeled, truncate, erose at the top. *Anthers* 3, .5 mm. long. *Upper floret* hermaphrodite, bearded on the callus; lemma 3 mm. long, with two lanceolate arista-crowned lobes, 3-nerved; between the lobes issues an 8 mm. long awn, of which the lower 4 mm. are flat glabrous and smooth, and the upper portion scabrid. *The awn* is not a prolongation of the central nerve but the base is produced laterally at the foot; the lemma is hairy in the lower half and bears two lateral beards of long hair. *Palea* 2.2-5 mm. long, narrow, ciliate on the margins, ending in 2 well-defined points. *Anthers* 3, up to .75 mm long, linear.

A very common grass in marshy places in the hills above 4,500 ft.

17. PANICEÆ.

Annual or perennial grasses, with herbaceous, very rarely woody culms; leaf-blades linear to lanceolate or ovate; spikelets usually similar, hermaphrodite, rarely unisexual, solitary or paired, usually falling entire at maturity, 2-flowered with the lower floret male or barren and with or without a palea and the upper hermaphrodite, rarely with both florets hermaphrodite or the upper female or male, arranged on the usually continuous rhachis of solitary, digitate or scattered spikes or racemes or in open or contracted, sometimes spiciform, panicles; rhachilla not produced beyond the upper floret; glumes usually membranous, the lower usually smaller, sometimes very small or suppressed, the upper usually as long as the spikelet, or shorter, very rarely suppressed; lower lemma similar to the upper glume, at least in texture, rarely indurated; upper lemma and palea similar in texture, usually indurated, often chartaceous to crustaceous or at least firmer than the glumes, awnless, very rarely with a straight short awn from the apex; lodicules usually 2; stamens usually 3.

Key to the genera of *Paniceæ*.

Spikelets falling singly, not subtended by bristles, or if so, then the bristles persisting after the spikelets have fallen (*Setaria*) :—

Both florets fertile, or the lower male and then with the lemma hardened and similar to the upper :—

Upper lemma and palea membranous, gaping at maturity. ..

1. Coelachne.

Upper lemma and palea indurated, closed at maturity.

2. Isachne.

Upper floret alone fertile; lemma of lower floret usually resembling the upper glume and not hardened :—

Spikelets arranged in more or less open panicles, or with the panicles contracted and spike-like :—

Spikelets not sub-tended by bristle-like branchlets :—

Spikelets arranged in open or contracted panicles :—

Spikelets not or only slightly gibbous :—

Fertile floret without lateral basal appendages or scars.

Upper glume as long as the spikelet. .. 9. **Panicum.**

Upper glume much shorter than the spikelet. .. 12. **Ottochloa.**

Fertile floret with lateral basal appendages or scars. 8. **Ichnanthus.**

Spikelets distinctly gibbous and laterally much-compressed. .. 10. **Cyrtococcum.**

Spikelets usually arranged in cylindrical spike-like panicles; upper glume inflated.

Upper lemma and palea indurated and closed at apex; upper glume not inflated, spikelets lanceolate. .. 6. **Saccolipsis.**

Upper lemma and palea membranous, gaping at apex. .. 7. **Hymenachne.**

Spikelets sub-tended by one to many bristle-like branchlets. .. 22. **Setaria.**

Spikelets arranged in one-sided spikes or spike-like racemes; spikes or racemes digitate or scattered, rarely solitary :—

Lemma of the upper floret more or less crustaceous or coriaceous, usually with narrow inrolled margins, exposing much of the palea :—

Spikelets dorsally compressed or almost terete, the glumes and lower lemma rounded on the back or only keeled at the tip :—

Lower glume and lowest internode of the rhachilla not forming a swollen callus at the base of the spikelet :—

Glumes and lemmas with lateral compressed and thickened apices. .. 3. **Acroceras.**

Glumes and lemmas not as above.

Lower glume (when present) turned away from the rhachis of the racemes or spike; the back of the upper lemma facing it, *i.e.*, spikelets adaxial.

Lower glume developed, although sometimes small:—

Spikelets not sunken in hollows in a thickened corky rhachis:—

Glumes acuminate or awned, rarely only acute; upper lemma not mucronate:—

Leaf-blades linear; racemes dense; culms erect or sub-erect ..

11. *Echinochloa*.

Leaf-blades lanceolate to ovate; racemes loose to moderately dense; culms creeping and ascending. ...

16. *Oplismenus*.

Glumes awnless, if acuminate, then with the upper lemma mucronate:—

Upper lemma acute, not mucronate. ...

14. *Paspalidium*.

Upper lemma obtuse, mucronate or very short-awned. ...

15. *Urochloa*.

Spikelets sunken in hollows in a thickened rhachis, the latter disarticulating at maturity. ...

21. *Stenotaphrum*.

Lower glume usually absent; spikelets plano-convex. ...

13. *Paspalum*.

Lower glume turned towards the rhachis, the back of the upper lemma turned

away from it, *i.e.*, spikelets
abaxial.

Lower glume present. .. 19. **Brachiaria.**

Lower glume absent. .. 20. **Axonopus.**

Lower glume and lowest in-
ternode of the rhachilla form-
ing a swollen callus at the
base of the spikelet; upper
lemma mucronate or short-
awned. .. 18. **Eriochloa.**

Spikelets laterally compressed,
obliquely ovate; upper glume
boat-shaped, with rows of glands
or hooked hairs or bristles
between the nerves. .. 17. **Pseudechinolæna**

Lemma of the upper floret thinly
cartilaginous, usually with flat
hyaline margins.

* Spikelets awnless .. 4. **Digitaria.**

Spikelets awned.

Upper glume awnless. .. 5. **Alloteropsis.**

Upper glume awned. .. 25. **Rhynchelytrum.**

Spikelets with an involucre of bristles or
sub-tended by a solitary bristle and fall-
ing with the bristles or bristle at
maturity, solitary or in clusters:—

Bristle solitary, formed by prolongation
of branch beyond terminal spikelet. .. 23. **Pseudoraphis.**

Bristles usually numerous. .. 24. **Pennisetum.**

1. COELACHNE R. Br.

Spikelets ovate-oblong to oblong, small, awnless, paired
or solitary, pedicelled on the slender branches of open or
contracted panicles; rhachilla disarticulating above the glumes
and finally between the florets, glabrous, elongated, not pro-
duced beyond the upper florets. *Florets* 2, upper much
smaller, exerted from the glumes, gaping at the apex at
maturity; lower hermaphrodite, upper male, callus very
short, obtuse. *Glumes* persistent; obtuse or rounded at the
apex, rounded on the back, membranous, usually glabrous,
lower up to half the length of the spikelet, broadly ovate to
broadly elliptic, or sub-rotund, nerveless or obscurely 1-5-
nerved; upper as much as $\frac{1}{3}$ the length of the spikelet,
elliptic to broadly elliptic, ovate or sub-rotund 3-7-nerved;
nervation sometimes obscure. *Lemmas* obtuse, rounded on

the back; lower broadly ovate-elliptic to sub-rotund, with incurved margins, nerveless or obscurely few-nerved, becoming slightly indurated; glabrous or pubescent at the base; upper lemma oblong to elliptic, nerveless or few-nerved, remaining membranous, more or less pubescent especially near the margins or towards the base. *Paleas* as long as the lemmas, lanceolate-oblong to elliptic, obtuse, 2-keeled with inflexed margins, the lower at length slightly indurated, the upper membranous pubescent. *Lodicules* 2 in the lower floret, broad, minute. Stamens 2-3; anthers barren, oblong. *Ovary* glabrous, styles distinct, terminal; stigmas plumose in the lower floret, laterally exerted, in the upper exerted near the apex. *Caryopsis* ellipsoid, loose between the palea and lemma; scutellum $\frac{1}{2}$ the length of the grain; hilum basal.

Low annual or perennial grasses; culms very slender, weak, often ascending from a decumbent base; leaf-blades linear to lanceolate, usually flat, thin; ligule reduced to a fringe of hairs, panicle slender, linear to ovate in outline, loose or dense and spike-like, branches simple or sparingly divided.

Coelachne simpliciuscula *Munro ex Benth.* in Journ. Linn. Soc. XIX (1881) 93. Syn. *C. pulchella* R. Br. Prod. 187 (in part).

Annual. *Culms* 15-45 cm. tall, rather weak, slender or sometimes sub-robust, ascending from a somewhat decumbent base, leaves almost up to the panicle. *Leaf-blades* lanceolate, tapering to a point, minutely scaberulous above, nerves striate; sheaths often loose, striate, nodes bearded; ligule a rim of hairs.

Inflorescence a very variable panicle, 6-10 cm. long, very slender and spike-like or spreading with distant, spreading, filiform branches; the branches may be either stiff or flaccid, glabrous or hairy. *Spikelets* sessile or shortly pedicelled, globose or ovoid, pedicels up to 1 mm. long, glabrous. *Lower glume* 1 mm. long, nervation obscure, herbaceous, sub-rotund; upper glume 1.5 mm. long, herbaceous, sub-rotund; nerves very obscure. *Lower floret* hermaphrodite; lemma 2 mm. long, rounded on the back, coriaceous; palea 2 mm. long, almost glabrous, coriaceous, margins incurved. *Upper*

floret imperfect, neuter or female; stipitate on the rhachilla; lemma 5-1.25 mm. long, narrow lanceolate or ovate, membranous; palea of the same shape, size and consistency.

Common in the hills in marshy places.

2. ISACHNE

Spikelets elliptic to elliptic-oblong, semi-elliptic, obovate or orbicular in profile, obtuse, acute or acuminate, awnless, usually small or minute, pedicelled in open or contracted panicles; rhachilla not or very rarely produced beyond the upper floret, disarticulating between the glume and lower floret and usually between the florets, the glumes also at length deciduous; florets similar or dissimilar; lower male or hermaphrodite; upper male or hermaphrodite, frequently on a short rhachilla joint. *Glumes* equal or nearly so, more or less similar, but the upper usually wider, from $\frac{2}{3}$ to quite as long as the spikelet, convex or the lower dorsally flattened membranous, glabrous or hairy, finely 5-9-nerved, or the lower 3-nerved. *Lower floret*: lemma narrowly elliptic-oblong to elliptic or obicular in back view, obtuse or rounded at the apex, plano-convex, as long as the spikelet or exceeded by the glumes, finely membranous, chartaceous or thinly coriaceous, glabrous or minutely hairy, obscurely 5-7-nerved; palea as long as the lemma and similar in outline, 2-nerved, dorsally flattened, embraced by the narrow involute margins of the lemma. *Upper floret*: lemma similar to that of the lower floret or smaller, firmer in texture and often hairy; palea corresponding in outline to the lemma and similar in texture. *Lodicules* 2, minute, cuneate. *Stamens* 3; anthers linear or oblong; filaments short. *Styles* distinct, short; stigmas terminally exserted. *Caryopsis* obovate, elliptic or rotund in outline, plano-convex, enclosed between the lemma and palea; scutellum elliptic; hilum basal.

Annual or perennial often aquatic grasses; culms slender, erect or more often geniculately ascending from a prostrate base, rarely suffrutescent; ligule reduced to a ciliate rim, blades linear to lanceolate or ovate, usually closely and prominently nerved on the upper surface; panicles sparingly or much livided; pedicels mostly with thick tips.

Key to the species of *Isachne*.

Lemmas similar in shape and texture and more or less in size; florets almost contiguous (Sect. Eu-*Isachne*).

Spikelets 8·2·5 mm. long; panicle 5-35 cm. long.

Leaf-blades ovate-lanceolate; smooth; spikelets 8·1·25 mm. long. .. 1. *I. clarkei*.

Leaf-blades linear to linear-lanceolate, scabrid; spikelets 1·2·5 mm.

Leaf-sheaths smooth; panicle 8-35 cm. long. 2. *I. albens* and

Leaf-sheaths rough; panicle 3·7·5 cm. var. *hirsuta*.

long. 3. *I. scabrosa*.

Spikelets 2·5·1·8 mm. long; leaves scabrid, sheaths smooth; panicle up to 10 cm. long. 4. *I. himalaica*.

Lemmas dissimilar, the lower larger, thinner, glabrous or nearly so, the upper smaller; florets separated by a minute rhachilla joint (Sect. Para-*Isachne*).

Leaf-blades lanceolate or linear-lanceolate; spikelets 1·8·2 mm. long. 5. *I. dispar*.

Leaf-blades ovate-lanceolate; spikelets 1·2·5 mm. long. 6. *I. miliacea*.

1. *Isachne clarkei* Hook. f. F.B.I., VII (1897), 24.

A very slender species. *Culms* finally erect, often decumbent and creeping at first, often rooting at the lower nodes. *Leaf-blades* 2·5-9 cm. long, flat, 3-6 mm. wide, ovate-lanceolate, acute, very thin, almost membranous, nerves very numerous, both surfaces scabrous with scattered hairs, margins thickened, cartilaginous, minutely serrate; sheaths closely fitting or rather loose, glabrous and smooth or rarely with a few scattered hairs, striate, margins thin, hyaline; ligule a ridge of stiff, closely-set bristles.

Inflorescence a loose panicle, 5·7·5 cm. long, 3·5 cm. wide, pyramidal, branches up to 2·5 cm. long. *Spikelets* 1 mm. long or less, scattered on the spreading capillary branches, very minute, seated on pedicels which are slightly swollen at the tips and longer than the spikelets. *Glumes* and lemmas equal in length 1 mm. long; glumes herbaceous, many nerved, ovate, sparsely hairy on the back. *Both lemmas*

similar in shape, size and texture (cartilaginous) the lower containing a male flower and the upper hermaphrodite; involute at the edges, scabrid on the dorsal surface. *Palea* almost as long as the lemmas and compressed by them. *Anthers* 3, minute.

NAGA HILLS, 6,000 ft. KHASI & JAINTIA HILLS 4-6,000 ft.

2. *Isachne albens* Trin. Sp. Gram. Ic. (1828) t. 25.

A tall perennial. *Culms* erect, or spreading in diffused light, branched, 30 cm.-1.3 m. tall. *Leaf-blades* flat, linear to linear-lanceolate, 5-20 cm. long, .7 cm.-2.5 cm. in width, midrib and several other nerves on either side distinct, surface rough, the upper more so than the lower; margins cartilaginous, minutely toothed; sheaths rather loose, smooth, striate; ligule a ridge of stiff hairs.

Inflorescence a decompound panicle, 8-40 cm. long, up to 20 cm. broad, branches and pedicels capillary, at first strict, erect, finally spreading. *Spikelets* minute, globose. 1-2.5 mm. long. *Lower glumes* orbicular, glabrous, 1 mm. long, many nerved, thin, equalling the upper in size. *Lemmas* similar, cartilaginous, pubescent on the dorsal surface, orbicular, obtuse, margins infolded. *Lower floret* male, upper hermaphrodite; occasionally the lower also hermaphrodite; palea somewhat shorter than the lemmas, hyaline, embraced by the former. *Anthers* 2, minute.

Very common all over the province up to 4,500 ft.

Var. *hirsuta* Hook f. F.B.I., VII (1897) 23.

The glumes are pubescent on the back. The sheaths are very hirsute. Leaves rather broad.

SYLHET & CACHAR.

3. *Isachne scabrosa* Hook. f. F.B.I., VII (1897), 23.

A perennial grass. *Culm* woody, .3-1 m. tall, finally erect from a rambling, geniculate base, internodes polished, smooth and glabrous, nodes bare. *Leaf-blades* 8-15 cm. long, 8 mm. to 1 cm. broad, linear-lanceolate, tapering to a fine point, somewhat scabrous on both surfaces, pale beneath, midrib and 2 or 3 other nerves on either side very obvious, margins thickened; sheath loose, striate, margins ciliate, often

covered with stiff hairs from tubercle-bases; ligule a ridge of hairs.

Inflorescence a decompound panicle 5-10 cm. long, pyramidal; branches flexuous up to 7 cm. long; pedicels of the spikelets rather short. *Glumes* similar, membranous about 1.8 mm. long, many-nerved, setulose on the back. *Lemmas* orbicular, the lower 1.5 mm. long, the upper slightly smaller, rhachilla minute. *Lower floret* generally male but may be hermaphrodite, upper usually hermaphrodite, ovate, margins incurved. *Anthers* 3, .5 mm. long.

Common in the KHASI HILLS, 4-5,000 ft.

4. *Isachne himalaica* Hook. f. F.B.I. VII (1897), 23.

An erect perennial. *Culms* erect from the base, 30-60 cm. tall, stout or slender, stiff, smooth or glabrous. *Leaf-blades* flat, linear, ensiform, midrib prominent, scabrid, margins thickened and minutely serrulate, ciliate at the mouth, 3-13 cm. long, up to 9 mm. broad, usually strict; sheaths glabrous, but the margins are densely hirsute; ligule a ring of stiff hairs.

Inflorescence a pyramidal panicle with strict branches 2.5-3.5 cm. long, rhachis and branches smooth and glabrous. *Spikelets* 2.5-1.8 mm. long, globose. *Lower glumes* ovate, membranous, many-nerved, dorsal surface glabrous, scabrid or bristly. *Lower lemma* 1.5 mm. long, ovate-hemispherical. *Upper lemma* usually smaller on the minute rhachilla joint. *Lower floret* usually male, upper hermaphrodite. Both of them of the same texture, i.e., chartaceous. *Stamens* 3; anthers .5 mm. long.

Common in marshes in the KHASI HILLS, 4-5,000 ft.

5. *Isachne dispar* Trin. Sp. Gram. Ic. (1828) t. 36.

Stems at first creeping and branching on the ground rooting at the nodes, and sending up flowering shoots from the nodes, finally erect 5-15 cm. high, sometimes even to 30 cm. tall, smooth and glabrous. *Leaf-blades* flat, rather stiff, striate, 1-5 cm. long, from ovate, tapering to a point, to lanceolate-acuminate, base usually cordate, scaberulous, margins thickened; sheaths rather loose, smooth, glabrous, shining,

ciliate at the mouth, margins shortly ciliate; ligule a very narrow, membranous ring fringed with long cilia.

Inflorescence a panicle, contracted and ovoid, or pyramidal and open, branches glabrous or obscurely scaberulous and very variable in length as are also the pedicels. *Spikelets* green or purplish, obtuse, 1-2.5 mm. long, smooth and polished, or scabrid and setulose. *Glumes* membranous, faintly many-nerved. *Lower floret*; lemma ovate-oblong, 2 mm. long, shining, thin, glabrous, smooth, enclosing a male flower, palea hyaline. *Upper floret* hermaphrodite; lemma coriaceous or chartaceous, 1.5 mm. long or less. *Stamens* 3. *Anthers* 1.25 mm.

GOALPARA.

6. *Isachne miliacea* Roth, Nov. Pl. Sp. (1821), 58.

A very variable plant. *Stems* often creeping upon the ground, branching at the nodes, finally erect, rarely reaching 20 cm. tall; internodes glabrous and smooth, nodes glabrous or ciliate. *Leaves* flat, small, 1-25 cm. long, 5 mm. broad, flaccid or firm, very finely nerved, margins slightly thickened, smooth, glabrous or very slightly hairy on both surfaces; sheaths closely fitting or rather loose, striate, glabrous but densely ciliate on the margins; ligule hardly membranous, almost entirely a ridge of cilia.

Inflorescence a panicle, loose or contracted. *Spikelets* 1.2-1.6 mm. long, globose, few in number and distant, seated on short or long, capillary pedicels. *Glumes* orbicular-oblong, almost hemispheric in outline, obscurely 7-nerved, often sparsely covered with long hairs. *Lower floret* male; lemma somewhat longer than the upper lemma, membranous; upper floret female; lemma smaller, coriaceous, hemispheric in profile; palea glabrous.

Common in marshes in the plains.

3. ACROCERAS Stapf.

Spikelets ovate-oblong to oblong, bluntly and thickly crested, sub-terete, falling entire from the pedicels, usually 2-nate or upwards solitary, more rarely fascicled, secund and abaxial on the angular rhachis of racemosely arranged,

mostly loosely, simple or sometimes compound, spiciform racemes; lower floret male or barren with a well-developed palea; upper floret hermaphrodite. *Glumes* sub-similar, membranous, pale below, greenish upwards or green all over, with a thick, dark green, laterally compressed, terminal crest, which is the end of a short sub-terminal keel; the lower usually shorter, more or less ovate-lanceolate and 3-nerved; the upper oblong, 5-nerved. *Lower floret* equalling the upper glume or almost so; lemma very similar to the upper glume; palea equal to the lemma or slightly shorter, hyaline, finely 2-keeled. *Upper floret*; lemma subcoriaceous, smooth, oblong, very obscurely keeled or broadly rounded on the back, with a blunt callous, green, laterally compressed, apical crest, narrowly involute with firm margins, faintly 5-nerved; palea equalling the lemma and similar in substance with rounded keels, each ending in a minute, more or less recurved callous tip. *Lodicules* 2, cuneate, fleshy. *Stamens* 3. *Styles* distinct; stigmas large, plumose, dark, exserted laterally above the middle. *Grain* tightly enclosed between the hardened lemma and palea, oblong, dorsally flat, ventrally convex; hilum filiform, as long or usually much shorter than the grain, rarely punctiform. *Embryo* obovate short.

Perennial or annual, usually with a long prostrate and rooting base; blades lanceolate to linear, often from a sub-amplexicaul or amplexicaul base; ligules reduced to a ciliate rim or quite obscure; panicles of distant slender secund spiciform or racemiform branches mostly bearing spikelets from the base or near it; spikelets quite glabrous and smooth.

Key to the species of *Acroceras*.

Spikelets close on the panicle branches.

Spikelets over 5 mm. long. .. 1. *A. zizanioides*.

Spikelets less than 4.5 mm. long. .. 2. *A. crassipiculatum*.

Spikelets widely spaced. .. 3. *A. tonkinense*.

1. *Acroceras zizanioides* (H.B.K.) Dandy, Journ. Bot. LXIX (1931) 54. Syn. *Panicum latifolium* Hook f. F.B.I. (1897) 39 (in part, not of Linn.).

Perennial. *Culms* ascending from a prostrate base often rooting at the nodes, reaching 60-120 cm. in height, simple

or sparingly branched, internodes very smooth and glabrous, somewhat compressed below. *Leaf-blades* lanceolate to lanceolate-linear from a broad suddenly constricted rounded base, tapering to a long, fine point, 7.5-12.5 cm. long by 1.2 cm. broad, spreading, firm, flat, glabrous or very finely pubescent and ciliate on the round base, smooth, margins finely scabrid; sheaths tight, firm, terete, striate; margins densely ciliate; ligules very narrow, membranous, ciliolate or almost suppressed.

Inflorescence a panicle, straight or nodding, 7.5-25 cm. long, made up of several, sub-erect, interruptedly spiciform or racemiform branches, distantly disposed on a central rhachis, which is angled and channelled; branches hairy at the base; pedicels short to long, scaberulous, tips truncate. *Spikelets* lanceolate-oblong, bluntly apiculate, 5-7.5 mm. in length. *Lower glume* lanceolate, base ovate, $2/3$ - $4/5$ the length of the spikelet, 3-5-nerved; middle nerve shortly keeled upwards; upper glume length of spikelet and same shape, 3-nerved, with laterally compressed, thick, blunt tip. *Lower floret* barren; lemma very similar to upper glume; palea reduced, oblong, acute, keels finely scaberulous. *Upper floret* hermaphrodite; oblong, 5 mm. long, lemma coriaceous, mucronate, minutely rough below mucro, tips of palea sub-crenulate, slightly recurved, palea same texture as lemma. *Anthers* 2-2.5 mm. long.

Very common in the ASSAM VALLEY.

2. *Acroceras crassiapiculatum* (Merr.) Burkill in Kew Bull. (1935) 317. Syn. *Panicum latifolium* Hook. f. loc. cit. not of Linn.

A (annual?) perennial grass. *Culms* slender, shortly erect from a widely creeping base, many noded, the lower emitting solitary and 2-3-nate roots, smooth and glabrous, except for a tuft of hair below the panicle; internodes longer than the sheaths. *Culms* prominently striate, 15-30 cm. high. *Leaf-blades* flat, somewhat firm, lanceolate, or narrowly ovate-lanceolate, tapering to a blunt tip from a rounded or sub-cordate base, 2-6 cm. long, 4-8 mm. broad, glabrous on both surfaces or rarely ciliate on the rounded base, minutely rough;

margins scabrid; sheaths persistent, loose below, close fitting above, striate, smooth and glabrous except for the outer margin of the sheath which is always ciliate; ligule obsolete.

Inflorescence a panicle 3-6 cm. long, consisting of few, sub-erect, interruptedly spiciform or racemiform branches disposed on a short, central rhachis which is deep channelled; branches hairy at the junction with the rhachis; pedicels short, or long, never exceeding the spikelet in length; spikelets ovate-lanceolate in shape, bluntly apiculate, 4.5 mm. long or shorter. *Lower glume* lanceolate from a clasping, ovate base, 3.25 mm. long, tip compressed, 3-nerved; upper glume as long as the spikelet, 7-nerved, tip compressed. *Lower floret* barren; lemma 4 mm. long, broadly ovate, apiculate, 7-nerved; tip thick, compressed; palea ovate-oblong, keels finely scaberulous, almost as long as the lemma. *Upper floret* hermaphrodite; lemma ovate, apiculate, 3.25 mm. tip compressed, smooth, shining, subcoriaceous, mucronate, markedly compressed; palea of the same size as the lemma and of the same substance.

LAKHIMPUR & SIBSAGAR.

3. *Acroceras tonkinense* (Balansa) C. E. Hubbard
ex Bor, Ind. For. Rec. (Bot.) I. 3. (1938) 78. Syn. *Panicum tonkinense* Bal. in Morot, Journ. de Bot. IV (1890) 140; *P. latifolium* L. var. *majus* Hook f. F. B. I. VII (1897) 39; *Neohusnotia tonkinensis* A. Camus in Bull. Mus. Paris (1920) 664.

A perennial herb with a creeping rhizome. *Culms* rooting at the base, almost erect or scrambling, branchy, with numerous pubescent nodes. *Leaf-blades* linear-lanceolate in shape, acuminate, cordate at the base, flat, 10-20 cm. long, 1.5-3 cm. broad, covered with a short pubescence above or glabrous; margins coriaceous, often undulate, scabrid, with a few cilia at the base; sheaths somewhat loose, open, striate, pubescent; ligules very short lacerate.

Inflorescence a panicle, 15-30 cm. long, very open; main axis robust, angled, grooved, scabrid; branches few, erect, triquetrous, scaberulous, 2-15 cm. long carrying 2-5 pairs of spikelets. *Spikelets* pedicelled (one pedicel 3-4 mm., the

other 10-25 mm. long, swollen at the apex) distant, ovate-lanceolate, compressed at the apex, somewhat inflated, 4·5-5·5 mm. long. *Lower glume* 4-4·5 mm. long, clasping, ovate, shortly keeled at the apex, abruptly mucronate, 5-nerved; upper glume 4·5-5·5 mm. long, ovate, shortly keeled and compressed at the apex, 5-nerved. *Lower floret* male; lemma 4·5-5·3 mm. long, somewhat coriaceous, ovate, rounded on the back, compressed and hairy at the apex, 5-nerved; palea 3·5-4 mm. long, thin, linear-lanceolate. *Upper floret* hermaphrodite, shortly stipitate; lemma 5 mm. long, coriaceous, smooth, shining, ovate, compressed at the apex, 5-nerved; palea 3·5-4·5 mm. long, ovate, 2-nerved. *Lodicules* 2, thick, ovate, auricled. *Stamens* 3. *Ovary* oblong, glabrous.

This grass has been gathered twice in the SURMA VALLEY. It is considered to be a good fodder grass in COCHIN-CHINA.

4. DIGITARIA Rich.

Perennials or annuals. *Leaves* linear or linear-lanceolate, often flat. *False spikes* often in clusters, digitate or more or less spaced on a common axis, solitary or rarely pedunculate and forming a panicle, simple or sometimes compound towards the base; rhachis triquetrous or flat, with the angles often herbaceous, winged; pedicels unequal. *Spikelets* narrowly appressed and imbricate, rarely distant, lanceolate or elliptic-oblong, plano-convex, caducous, often 2-3-nate, 2-flowered; the lower reduced; appearing glabrous by reason of the very fine mat of hairs in lines between the nerves, rarely glabrous; lower glume often small, (sometimes 0), hyaline; upper muticous, membranous, shorter than the spikelet, rarely larger, 3- (rarely 0- or 5-) nerved. *Lower floret* neuter; lemma often like the upper glume 3-9-nerved, nerves straight, parallel, strong; palea very small. *Upper floret* hermaphrodite; lemmas papyraceous; 1-3- (rarely 5-) nerved, palea almost as large and of the same texture, 2-nerved; the margins of the lemma spread over the face of the palea leaving little of it exposed. *Lodicules* 2, small, broadly cuneate. *Stamens* 3. *Ovary*;—styles distinct; stigmas laterally exerted towards the summit of the spike-

let. *Caryopsis* narrowly enclosed between the scarcely indurated lemma and palea, oblong, slightly compressed; hilum basal, punctiferous; embryo not half the length of the caryopsis.

Key to the species of *Digitaria*.

Spikelets 2.3-5 mm. long, glabrous or fringed with fine, acute hairs.

Spikelets lanceolate to lanceolate-oblong.

Spikelets 3.3-5 mm. long; nerves in lower lemma evenly spaced; racemes 10-15 cm. long and finely pubescent at the base; rhachis broad, .7-1 mm.

1. *D. adscendens*.

Spikelets 2.2-5 mm. long; lateral nerves of lower lemma near the margin; racemes 6-10 cm. long; rhachis slender.

2. *D. pruriens*.

Spikelets ovate to elliptic.

Racemes numerous, 8-15 cm. long; spikelets dense; tall grass, cultivated.

3. *D. corymbosa*.

Racemes few, up to 8 cm. long; spikelets loose.

4. *D. bifasciculata*.

Spikelets less than 2 mm. long, or, if slightly longer, with very short curled or matted hairs.

Pedicels prominent, spreading, 3 mm. long; spikelets spreading, rather loose, rhachis very slender triquetrous.

Spikelets minutely pubescent; panicle 15-25 cm. long; racemes 15 cm. long.

5. *D. jubata*.

Spikelets glabrous or almost glabrous; panicle 4-8 cm. long; racemes 4-8 cm. long.

6. *D. pedicellata*.

Pedicels very short, 1 mm. long; spikelets appressed close together; rhachis flattened.

Lemma and palea of the upper floret brown or black; annual grasses with erect or ascending culms.

Spikelets 1.5-2.3 mm. long; upper glume as long as or rarely as long as the spikelet.

Spikelets 1.5-1.7 mm. long.

7. *D. violascens*.

Spikelets 2.2-3 mm. long, peduncle hairy; hairs clavate-tipped.

8. *D. ternata*.

Spikelets about 1 mm. long, upper glume very short; hairs clavate tipped.

9. *D. royleana*.

Lemma and palea of the upper floret pale; spikelet 1.3-1.5 mm. long, upper glume as long as the spikelet; creeping perennial.

10. *D. longiflora*.

1. Digitaria adscendens (H. B. K.) *Henr.* in *Blumea* I (1934) 92. Syn. *Panicum adscendens* H. B. K. *Nov. Gen. et Sp.* (1815) 97.

An annual. *Culms* 30-60 cm. high, tufted, ascending from a geniculate or prostrate, often rooting base, simple or branched at the lower nodes, glabrous. *Leaf-blades* linear-lanceolate to linear, from a slightly contracted and rounded base, tapering to a sharp point, up to 12.5 cm. long by 4-8 mm. wide, flat, flaccid, glabrous or sparingly hairy towards the mouth; margins finely cartilaginous, rough; sheaths thin, loose, glabrous or with spreading tubercle-based hairs forming a loose beard at the base; ligules membranous, truncate up to 1 mm. long.

Racemes 4-9, sessile, subdigitate, solitary or 2-3-nate on an angular, scaberulous axis, erect or spreading, slender, striate or flexuous, 5-15 cm. long, finely pubescent at the base; rhachis almost straight, triquetrous, lateral angles winged, scabrid; pedicels 2-nate, one very short, the other up to 1.5 mm. long, angular, scabrid. *Spikelets* appressed, not or only slightly imbricate, lanceolate, acutely acuminate, 2-3 mm. long, pale-green, rarely tinged with purple, variously hairy, rarely quite glabrous. *Lower glume* an ovate, obtuse to subacute, membranous scale, usually not above 4 mm. long, sometimes obsolete or suppressed; upper ovate-lanceolate, acute, equalling, or more often exceeding considerably, half the upper floret, 3-nerved, with fine lines of hairs between the nerves and along the margins, rarely quite glabrous. *Lower floret* sterile; lemma membranous, corresponding in shape and size to the spikelet, 7-nerved, nerves smooth, rarely glabrous, palea and lodicules minute. *Upper floret* hermaphrodite; lemma oblong-lanceolate, acutely acuminate, almost as long as the spikelet, thinly chartaceous, pale or slightly purplish, brown when mature; palea of same texture. *Anthers* 3, .75 mm. long. *Caryopsis* oblong, 1.6 mm. long, plano-convex, whitish; scutellum less than $\frac{1}{2}$ the length of grain.

Common everywhere.

2. Digitaria pruriens Buese in Miq. Pl. Jungh. (1854) 379. Syn. *Paspalum sanguinale* Hook f. F.B.I. VII (1897) 16 (in part) non Lamk.

Culms decumbent and creeping at the base, branching, often channelled and compressed, nodes few, slightly swollen and kneed. *Leaves* 2.5-15 cm. long, 4-6 mm. wide, linear-lanceolate, very acute, margins white, often with long white tubercle based hairs near the mouth, more or less hairy or rough; sheaths rather loose and more or less hirsute especially the lower; ligules membranous, 2 mm. long, long truncate.

Inflorescence a panicle of 3-9 false spikes (rarely) 12) erect, contracted, green; rhachis narrow, .3-.5 mm., flexuous, hispidulous; pedicels 2-nate, the smaller .5 mm. long, the other 2.2-2.5 mm. long. *Spikelets* 3 mm. long, linear-lanceolate or lanceolate-elliptic, acute appressed; lower glume small or absent; upper glume .8-1.2 mm. long, oblong, 3-nerved, glabrous or ciliate. *Lower floret*; lemma 3 mm. long, linear-lanceolate, acute, 7-nerved, glabrous and slightly villous on the nerves and at the apex; palea absent. *Upper floret* hermaphrodite; lemma coriaceous and finally white, cartilaginous, glabrous 2.8 mm. long, convex elliptic-lanceolate, acuminate; palea of the same texture as the lemma 2.8 mm. long.

Common, up to 4,000 ft.

3. Digitaria corymbosa (Roxb.) Merr. Enum. Philip. Fl. Pl. 1. (1925) 53. Syn. *Panicum corymbosum* Roxb. Hort. Beng. (1814) 7.

Annual. *Culms* tufted, widely creeping below and rooting at the nodes, stout or slender, smooth and glabrous up to 1.5 m. tall. *Leaves* linear to linear-lanceolate, up to 20 cm. long by 1.2 cm. broad, surfaces rough, flat, flaccid, base rounded or tapering, margin thickened and scabrid; (a few hairs with tubercle bases at the junction of the blades and sheath on the margin); sheath loose, striate; ligule membranous, truncate, 2 mm. long.

Inflorescence made up of racemes of spikelets, up to 20, 10-15 cm. long, subdigitately arranged on a short common

axis, rhachis narrowly winged, margins scabrid; pedicels angled, scabrid on the angles, 2-nate. *Spikelets* elliptic-acute, about 3 mm. long; lower glume a small hyaline scale; upper glume half the length of the upper lemma and much narrower, lanceolate, ciliate on the margin, 3-nerved, sparsely hairy on the dorsal surface; lower floret sterile; lemma membranous, hyaline 5-7-nerved, equalling the spikelet in shape and size, hairy on the lateral nerves or pubescent; palea absent. *Upper floret* hermaphrodite; lemma elliptic-acute, almost apiculate, chartaceous, pale, shining, minutely punctate; margins inturned and clasping the palea; palea of the same substance; flaps covering ovary and stamens. *Anthers* 1.75 mm. long.

Merrill *loc. cit.* "the spikelet is distinguished by the almost obsolete 1st glume, and short 2nd glume, the latter rarely more than $\frac{1}{4}$ as long as the spikelet."

Extensively cultivated at 5-6,000 ft. in the KHASI HILLS.

4. Digitaria bifasciculata (*Trin.*) *Henr. Meded.* Rijks. Herb. no. 61 (1930) 60, based on *Panicum bifasciculatum* Trin. Gram. Panic. (1826) 76. Syn. *Panicum cruciatum* Nees ex Steud. Syn. Pl. Glum. (1854) 39.

An annual. *Culms* 50-80 cm. tall, ascending, robust, glabrous with puberulous nodes, the lower often rooting. *Leaf-blades* spreading, lanceolate, acuminate, with the base slightly contracted, firm, flat, margins scaberulous, 5-20 cm. long by 5-8 mm. wide; sheaths open, glabrous; ligule membranous, truncate, 3 mm. long.

Inflorescence made up of several false spikes, the lower spreading, often flexuous, almost panicle-like, 5-8 cm. long; main axis often flexuous, scarcely thicker than the rhachis of the false-spikes, 1-1.3 mm. broad, triquetrous, wing developed, margins scaberulous, internodes 3 mm. long; pedicels 2-nate, the lower .75 mm. long, the upper 1.75-2.5 mm. long. *Spikelets* greenish or violet, 3-3.5 mm. long, ovate-oblong, acute, or cuspidate-acuminate, rather laxly imbricate, glabrous or nearly so. *Lower glume* very small or absent; upper glume 1.5-1.7 mm. long, ovate-oblong, obtuse, 3-nerved, often hairy on the margins. *Lower floret* sterile;

lemma 3-3.5 mm. long, ovate-oblong, obtuse, 7-nerved, margins often scantily hairy. *Upper floret* hermaphrodite; lemma 3-3.5 mm. long, ovate, cuspidate, acuminate, rather turgid.

This is perhaps the wild plant of *D. corymbosa*; the two are very close together.

Common in plains and hills.

5. *Digitaria jubata* (Gris.) Henr. in Blumea I (1934)

100. Syn. *Paspalum jubatum* Gris. in Goett. Nachr. (1868) 84.

An annual. *Culms* .6-1.3 m. high, erect or from a shortly decumbent base, rooting at the lower nodes, rather stout, shining, simple or branched, smooth and glabrous. *Leaf-blades* 15-25 cm. long, 4-6 mm. wide, linear or linear-lanceolate, tapering to a fine point, many nerved, median nerves prominent, smooth and glabrous or upper surface and margins rough; sheaths loose and falling away from the culms, striate, smooth and glabrous, or lower sheaths hirsute with appressed short hairs; ligule 2 mm. long, membranous, rounded.

Inflorescence a panicle 15-25 cm. long, of many false spikes on a stout central axis; axis slightly twisted, angled, striate and channelled, scabrid on the angles or glabrous; racemes 10-15 cm. long often whorled below, flexuous, fine, narrow, scaberulous, hairy at junction with axis bearing very secund spikelets; spikelets 1.25-1.75 mm. long, elliptic or obovate-elliptic, pubescent, 1- or 2- to more-nate; spikelets green or purplish; pedicels up to .5-.8 mm. long, flexuous, scabrid, with discoid tips. *Lower glume* absent; upper glume almost as long as the spikelet, membranous, oblong-obtuse, pubescent on the dorsal surface, obscurely nerved. *Lower floret* barren; lemma membranous, oblong or broadly oblong-obtuse, 5-nerved, pubescent on the dorsal surface, shortly ciliate on the margins; palea absent. *Upper floret* hermaphrodite; lemma broadly ovate-acute, brown or pale, shining, striate, 1.5 mm. long, margins broad, almost covering the palea; palea of the same substance as the lemma,

narrowly ovate-acute, smooth, striate, with margins infolded. *Stamens* 3, linear-oblong, .75 mm. long.

Plains of both VALLEYS.

6. *Digitaria pedicellaris* Prain, Beng. Pl. (1903) 1182. Syn. *Paspalum pedicellare* Trin. ex Steud. Nom. Ed. 2. II (1841) 272.

An erect herb (annual or perennial). *Culms* 15-70 cm. tall, slender, tufted, branched and kneed at the base. *Leaf-blades* narrowly linear-lanceolate, finely acuminate, flat or rolled, glabrous or pubescent, 5-15 cm. long, 2-4 mm. broad, margins minutely scabrid; sheaths narrow, the lower hairy; ligules short, scarious.

Inflorescence a panicle of 5-10 false spikes or racemes, slender, alternate, sub-terminal, contracted, erect or spreading, lax, 2.5-10 cm. long, rhachis very slender, hardly winged, margins minutely scabrid; pedicels 2-5-nate, unequal, slightly swollen at the tip, scaberulous. *Spikelets* ovate or elliptic, acute, mucronate, spaced, 1.25-1.5 mm. long; the upper of each fascicle on a pedicel which exceeds the lower spikelet in length. *Lower glume* absent, upper 1 mm. long, elliptic, acute or ovate-oblong, membranous, 5-nerved; hairs very slender, with thin smooth walls, .25-.35 mm. long, slightly swollen at the tip. *Lower floret* sterile; lemma 1-1.25 mm. long, membranous, ovate-oblong, acute, 5-nerved pubescent. *Upper floret* hermaphrodite; lemma 1.25-1.5 mm. long, coriaceous, brownish or yellowish, elliptic-oblong, acuminate, mucronulate, delicately punctate, with much incurved margins; palea narrower, of the same length as the lemma, coriaceous, brownish or yellowish, elliptic-oblong or ovate-oblong, with strongly incurved margins.

In the plains and foothills.

7. *Digitaria violascens* Link, Hort. Berol. I (1827) 229.

Annual. *Culms* up to 45 cm. long, from a prostrate and straggling base, rooting at the nodes, smooth and glabrous. *Leaf-blades* 6-20 cm. long, 4-7 mm. wide, linear to narrow linear-lanceolate, tapering to a very fine point,

gradually contracted at the base, somewhat rough on both surfaces, flat, flaccid; margins scarcely thickened, scabrid; sheaths rather loose, shorter than the internodes, smooth and glabrous; ligules short, membranous, truncate.

Inflorescence made up of about 5 false spikes or racemes, very often subdigitate, slender, 8-13 cm. long, erect or slightly curved outwards; rhachis .8 mm. wide, flat with a very prominent midrib, wing definite, scabrid; peduncles 2-nate, one longer than the spikelet and the other shorter. *Spikelets* biseriate, imbricate, elliptic-oblong, acute, glabrescent or silky, 1.2-1.7 mm. long. *Lower glume* very short or absent; upper glume 1.2-1.7 mm. long, convex, ovate-oblong, 5-7 nerved, silky, hairs thin and appressed. *Lower floret* sterile; lemma rather like the upper glume, somewhat longer and flat, 5-7-nerved. *Upper floret* hermaphrodite; .8-1.5 mm. long, oblong-lanceolate, acute, somewhat coriaceous, smooth or minutely punctate, brownish black or purple black; margins incurved; palea a little shorter than the lemma, of the same texture and substance; margins strongly incurved.

KHASI & JAINTIA & NAGA HILLS, 3-5,000 ft.

8. *Digitaria ternata* Stapf in Dyer, Flor. Cap. VII, 376. Syn. *Paspalum ternatum* Hook. f., F. B. I. VII (1897) 17.

Annual. *Culms* fascicled, erect or decumbent below, 15-50 cm. long, simple, rarely branched, tufted, peduncle long exserted. *Leaf-blades* up to 20 cm. long, 4-8 mm. wide, linear-lanceolate or linear, glabrous or slightly rough, flat, flaccid, margins minutely scabrid; a few cilia with tubercle-bases on the margin of the rounded base; sheath smooth and glabrous or with a few white hairs, striate, rather loose; ligule short, membranous, truncate.

Inflorescence of 3-5 subdigitate racemes on a short common axis up to 12.5 cm. long, usually only 8 cm. long; rhachis flat, narrowly winged; margins scabrid; midrib prominent; pedicels 2-3-nate, hispidulous, with a tuft of hairs at the slightly swollen tips. *Spikelets* elliptic-oblong,

obtuse, 1-1.25 mm. long, appressed, subimbricate. *Lower glume* absent, upper shorter than the upper lemma and much narrower, 3-nerved with 4 lines of clavate-tipped silvery hairs often forming a dense fringe at the margins; lower floret neuter; lemma oblong, sub-acute, equalling the spikelet in shape and size, margins embracing the spikelet, 5-7-nerved, more or less dense-covered with clavate-tipped hairs, fringed on the margins. *Upper floret* hermaphrodite; lemma chartaceous, brown, elliptic, subacute margins strongly incurved, overlapping at the apex; palea of the same shape, colour and substance as the lemma, margins incurved.

KHASI & JAINTIA HILLS, 4-5,000 ft.

9. *Digitaria royleana* Prain, Beng. Pl. (1903) 1182.
Syn. *Paspalum royleanum* Nees ex Thw. Enum. Pl. Zeyl. (1864) 358.

[An] annual. *Culms* erect or short, geniculate at the base, tufted, up to 50 cm. tall, very slender, smooth and glabrous. *Leaf-blades* linear to lanceolate, tapering gradually to a fine point, flat, flaccid, usually 6-10 cm. long, in robust specimens up to 20 cm. long, 2-3 mm. wide, many-nerved, midrib prominent, scarcely rough on both surfaces, margin minutely scabrid, glabrous or with scanty or dense, white, long villæ from tubercle-bases; sheaths rather loose, striate, rough or smooth, glabrous or with numerous white hairs from tubercle-bases; margins glabrous or densely hirsute, throat hairy; ligules reduced to a membranous rim, ciliate or not.

Inflorescence a panicle made up of 3-6 (or rarely more) racemes sometimes subdigitate, usually alternate. *Racemes* 4-8 cm. long (in robust specimens up to 20 cm.), ascending, finally slightly recurved; rhachis flat, flexuous, winged, margins scabrid, slightly convex on the back; pedicels 1-2-3-nate, usually 2-nate, flexuous or straight; less than or equal to the length of the spikelet or longer, scabrid and/or with setæ, tip slightly swollen, usually with a few long cilia at the base of the spikelet. *Spikelets* 1-1.25 mm. long, elliptic, broadly oblong, acute, imbricate, very numerous. *Lower glume* absent; upper glume absent or represented by a few hairs thus exposing the whole of the

upper lemma. *Lower floret* neuter; lemma membranous, equalling the spikelet in size and shape, hyaline, nerves 5, prominent, dorsal surface more or less covered with thick walled, clavate-tipped short hairs; palea absent. *Upper floret* hermaphrodite; lemma subcoriaceous, brown or black, longitudinally striolate, elliptic-oblong, sub-acute; margins overlapping; palea of the same texture and shape as the lemma; margins overlapping below.

Can be easily distinguished from *D. longiflora* by the mealy pubescence on the lower lemma and on the upper glume if present.

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10. *Digitaria longiflora* Pers. Syn. 1. (1805) 85
Syn. *Paspalum longiflorum* Retz. Obs. IV (1786) 15 (non Trin.).

Annual. *Culms* often creeping extensively and sending up erect shoots from the nodes; flowering branches erect, slender. *Leaf-blades* lanceolate to linear, acute, 1-6 cm. long by 2-4 mm. wide, spreading, flat, soft, glabrous or with a few hairs; sheaths rather tight, glabrous or rarely the lower more or less hairy and sparingly bearded at the nodes; ligule short, truncate, membranous.

Inflorescence of 2-3 racemes, rarely more, which are sessile, digitate, slender, 2.5-7.5 cm. long, erect or spreading, pale-green in flower; rhachis flat, straight; margins scabrid; pedicels 2-3-nate, terete with discoid tips, the longer up to 2 mm. long. *Spikelets* appressed, sub-imbricate, elliptic-oblong, acute, 1.3-1.5 mm. long, pale-green or whitish owing to fine appressed pubescence. *Lower glume* absent, upper delicate, broad oblong, sub-obtuse or sub-acute, as long as or almost as long as the spikelet, 5-3-nerved, with dense lines of appressed hairs between the nerves and along the margin. *Lower floret*; lemma hyaline, shape and size of spikelet, 7-nerved, with rows of appressed pubescence between the nerves; palea and lodicules microscopic. *Upper floret*; lemma equalling the spikelet, shortly acute or sub-apiculate, slate-colour to olive-green when ripe, thinly chartaceous, margin overlapping; palea of the same sub-

stance as the lemma. *Anthers* .5 mm. long. *Caryopsis* ellipsoid, slightly compressed, .8 mm. long.

Very common up to 2,000 ft.

5. ALLOTEROPSIS Presl, emend. Hitch.

Spikelets ovate or elliptic to lanceolate-oblong acute or acuminate, mostly awned, slightly or conspicuously compressed from the back, falling entire from the pedicels, 2-nate or fascicled, sub-second and abaxial on the triquetrous rhachis of more or less spiciform, digitate or sub-digitate racemes; lower floret usually male; upper floret hermaphrodite. *Glumes* unequal, lower smaller, membranous to hyaline 3-1-nerved, very acute often mucronulate; upper equal or sub-equal to the spikelet, membranous to chartaceous, 5-nerved with the outer nerves submarginal, densely ciliate along them. *Lower floret*; lemma resembling the upper glume, but ciliate, the tips minutely truncate, and the lateral nerves approximate to each other and in or near the marginal flexure; palea short, deeply 2-fid with conspicuously auricled flaps. *Upper floret*; lemma chartaceous, glabrous, delicately ciliolate upwards, 5-nerved, produced into a straight awn or mucronate; palea equal to the lemma, 2-keeled with broadly auricled flaps. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Styles* distinct; stigmas laterally exerted. *Caryopsis* enclosed by the lemma and palea, elliptic-oblong, dorsally much compressed; hilum basal, punctiform.

Perennials or annuals; leaf-blades flat or more or less convolute; ligule membranous, ciliate or ciliolate, short or reduced to a rim; racemes sessile or peduncled, often more or less compound towards the base, digitate or sub-digitate or a more or less elongated common axis.

Key to the species of *Alloteropsis*.

- | | |
|--|--------------------------|
| False spikes sub-digitate, 2-5; spikelets 6 mm. long; lemma of the upper floret long aristate. | 1. <i>A. semialata</i> . |
| False spikes sub-verticillate, 3-8; spikelets 3-4 mm. long; lemma of the upper floret abruptly and shortly aristate. | 2. <i>A. cimicina</i> . |

1. Alloteropsis semialata Hitch., Contrib. U. S. Nat. Herb. XII (1909) 210. Syn. *Axonopus semialatus* Hook. f. F. B. I. VII (1897) 64.

Perennial. *Culms* 30-40 cm. tall, erect, densely tufted, thickened at the base, covered with the silky debris of old sheaths, lower internodes short, nodes velvety. *Leaf-blades* 20-30 cm. long by 4-6 mm. wide, narrowly linear, very narrow at the base, straight, acuminate, stiff, the majority at the base, glabrous or pubescent, margins almost smooth, sometimes carrying a few long hairs with tubercled bases; sheaths hairy; margins ciliate, ligules obscure hairy.

Inflorescence made up of 2-5 false spikes, subdigitate or subverticillate, erect or scarcely divergent, 6-15 cm. long, on a long, straight peduncle more or less hairy; rhachis rather robust, straight, more or less pubescent, often with spikelets to the base. *Spikelets* sessile or sub-sessile, pale or brown, 6 mm. long; lower glume with 3 strong nerves, ovate-acute, acuminate, aristulate more or less, with ciliate margins; upper glume 5.5 mm. long, broadly ovate-lanceolate, acute or acuminate, shortly aristate, with large, pale or dark hairs on the margins, 5-nerved. *Lower floret* male, lemma 6 mm. long, rather more rigid than the glume although thin, ovate-lanceolate, acuminate, with inturned margins, ciliate; palea much reduced. *Upper floret* hermaphrodite; lemma 6 mm. long, more rigid but hardly thicker, oblong-lanceolate, acuminate, margins narrowly incurved, pubescent, ending in a scabrid cusp exceeding the very stout crest of the upper glume; palea rather rigid, ovate-elliptic; margins inflexed, thin, with a distinct lobe at the base on either side. *Anthers* 3.3-5 mm. long.

Common in the KHASI HILLS 4-5,000 ft. being found at Mawphlang, Sweet Falls, Nartiang and elsewhere.

2. Alloteropsis cimicina Stapf, in Flor. Trop. Afr. IX. 487. Syn. *Axonopus cimicinus* Beauv. Ess. Agrost. (1812) 12.

Perennial. *Culms* 30-60 m. high, tufted, erect or decumbent and geniculate at the base, glabrous or hairy, nodes hirsute. *Leaf-blades* flat, 2.5-7.5 cm. long, by 1.25-2.5

cm. wide, ovate or ovate-lanceolate, sharp, base cordate and broad, hirsute, rarely glabrescent, long white hairs on both surfaces spreading, margins ciliate with long white hairs, rather distant at the base and few tubercle bases; sheaths glabrous or hirsute; ligule reduced, hairy.

Inflorescence made up of 3-8 false spikes, sub-verticillate, 7.5-15 cm. long, rarely longer, at the top of a long glabrous peduncle; rhachis filiform, flexuous, simple or branched, slightly scabrous, naked at the base; pedicel sometimes equal in length to the spikelet, swollen at the top, glabrous. *Spikelets* pale, rather shining, ovoid, dorsally compressed, 1-2-nate, laxly imbricate or distant. *Lower glume* 1.6-2.6 mm. long, ovate-lanceolate, acuminate, 3-5-nerved, nerves green, the lateral joining the median below the summit; margins membranous; upper glume 2.5-4 mm. long, membranous, ovate-lanceolate, mucronate or slightly aristate, long velvety on the margins. *Lower floret* male; lemma 2.5-4 mm. long, ovate-obtuse; palea very much reduced. *Upper floret* hermaphrodite; lemma 2.5-3 mm. long, smooth, ovate-oblong, abruptly aristate, glabrous, margins narrowly incurved, obscurely 3-nerved, produced into a setiform awn, palea ovate-elliptic, subcoriaceous. *Anthers* .5-1 mm. long. *Caryopsis* ovate, flattened.

Fairly common in the plains.

6. SACCOLEPIS Nash.

Spikelets oblong to ovate-oblong or elliptic or lanceolate, subterete or laterally compressed, frequently more or less oblique (seen in profile), usually somewhat turgid, falling entire from the short, finely filiform pedicels of a spiciform panicle; lower floret male or barren; upper hermaphrodite. *Glumes* similar in structure but unequal, the lower being much shorter softly or rigidly membranous, with a narrow hyaline margin or hyaline tip, stiffened by the hardening of the prominent and often rib-like nerves, or more or less dissimilar owing to the reduction of the lower glume to a small hyaline scale, or its differentiation into a narrow, hardened, obscurely nerved back and broad hyaline margins; upper glume with a curved or basally gibbous or saccate back, always much concave, mostly 7- or 9- rare 5- or up

to 13-nerved. *Lower floret*; lemma similar to the upper glume and of the same or almost the same length but with a straight back; palea narrow, hyaline, finely 2-keeled, shorter than the lemma, sometimes much more reduced or quite rudimentary. *Upper floret*; lemma oblong in outline when seen from the back, very convex, chartaceous, ultimately subcrustaceous, with firm narrowly involute margins, obscurely 5-nerved; palea almost as long as the lemma, lightly embraced by it all long and of the same texture, 2-nerved, hardly keeled. *Lodicules* 2, small, broadly cuneate. *Stamens* 3. *Style* distinct. *Stigmas* long, loosely plumose, exerted terminally or subterminally. *Caryopsis* tightly enclosed by the somewhat hardened palea and lemma, elliptic in outline, dorsally compressed, with an almost flat back and convex face; hilum punctiform; embryo more or less half the length of the grain.

The correct spelling of the name of the genus is *Saccolipsis*, as invented by Nash himself; there does not seem to be any reason why later botanists should spell the name *Sacciolepis*.

Key to the species of *Saccolipsis*.

Spikelets acute.

Spikelets 4-5 mm. long. .. 1. *S. interrupta*.

Spikelets 2.5-3.5 mm. long. .. 2. *S. indica*.

Spikelets obtuse, 1.5-2 mm. long. .. 3. *S. myosuroides*.

1. *Saccolipsis interrupta* Stapf in Prain Flor. Trop. Afr. IX. 757. *Panicum interruptum* Willd. Sp. Pl. I (1797) 341.

A large perennial grass, quite glabrous; culms up to 1.5-1.8 m. long, ascending from a stout creeping and rooting or floating rootstock; lower nodes emitting fascicles of long, stout roots clothed with root hairs; upper internodes very long, slender. *Leaf-blades* 15-30 cm. long, by 6-13 mm. wide, linear, finely acuminate, soft flat glabrous, with smooth or scaberulous margins, base rounded or subcordate, sheaths 5-10 cm. long, with smooth margins; ligule short, broad, membranous.

Inflorescence a spikelike panicle, 15-30 cm. long by 6-8 mm. wide, cylindric, interrupted below; rhachis short,

strict, channelled. *Spikelets* 4-5 mm. long, densely crowded in small fascicles, sub-sessile or shortly pedicellate, spreading, ovoid-lanceolate, acute, green. *Lower glume* scarcely 1.6 mm. long, broadly ovate, obtuse, hyaline, 3-5-nerved. *Upper glume* ovate, acute, herbaceous, membranous, prominently 9-nerved. *Lower floret* male or barren; lemma equaling the upper glume in length, ovate, acute, 7-nerved; palea hyaline. *Upper floret* hermaphrodite; lemma shorter than the lemma of the lower floret, ovate-oblong, subacute, thinly coriaceous, white, polished, dorsally convex, palea thinly coriaceous as long as the glume. *Anthers* purple, much exserted. *Caryopsis* obovoid, apiculate.

A good fodder grass for stock and very much relished by elephants. Very common in marshes and bils in the plains.

2. *Saccolipsis indica* A. Chase in Proc. Biol. Soc. Wash. (1908) 8. Syn. *Panicum indicum* Linn. Mant. II (1771) 184.

A tufted annual. *Culms* 1-1.8 m., ascending or erect, branchy, striate, slender, compressed and with a leafy base, glabrous, cylindrical, bare at the top. *Internodes* long. *Leaf-blades*, soft, spreading, linear-acuminate, base narrow or rounded, flat, 3-10 cm. long, 2.5-4.5 mm. broad, glabrous or hairy below, margins scabrid, nerves numerous; sheaths open, somewhat lax, compressed, sub-keeled at the top, the lower short, glabrous with glabrous margins; ligule short, obtuse, shortly fimbriate at the summit.

Inflorescence a narrow panicle, erect, spiciform, dense, rarely interrupted, 1.25-7 cm. long; rhachis slender, glabrous; branches simple, numerous, short, appressed and sometimes adnate to the axis; pedicel glabrous, short, swollen at the tip. *Spikelets* densely crowded, erect or spreading, longer than the pedicels, olive-green, sometimes purplish, or bluish, ovoid-acute, more or less gibbous and decurved, sub-compressed, glabrous or often hispid, 2.5-4 mm. long. *Lower glume* .5-1.5 mm. long, membranous, clasping, ovate-acute, strongly 3-5-nerved, margins hyaline; upper glume 1.5-4 mm. long, membranous-herbaceous, ovate-obtuse, sub-acute, cymbiform, rather gibbous, strongly 7-11-nerved, often

ciliate with stiff silk, swollen at the base. *Lower floret* male, lemma 1.5-4 mm., herbaceous, membranous, ovate-obtuse, not gibbous, strongly 7-9-nerved, sometimes ciliate; palea small, hyaline. *Upper floret* hermaphrodite; lemma 1.3-3.7 mm. long, whitish, oblong, or ovate, sub-acute, acute or acuminate, mucronulate, convex on the back, smooth, sub-coriaceous, shining, with margins strongly clasping; palea ovate-oblong rather obtuse, smooth, shining with margins strongly inflexed. *Stigmas* violet. *Caryopsis* oblong.

Common all over the province, particularly so in the hills.

3. *Saccolapis myosuroides* A. Camus in Lecomte, Flor. Gén. de l' Indo-Chine VII. 460. Syn. *Panicum myosuroides* R. Br. Prod. (1810) 189.

Culms 40-60 cm. tall, erect or slightly decumbent at the base, striate, slender or robust, bare at the summit, inferior node more or less geniculate, glabrous. *Leaves* narrowly linear, finely acuminate, with a narrow base with long woolly hairs, scabrid above, 15-20 cm. long, 2.5-6 mm. wide, many-nerved, slender, the median most prominent, margins scarcely scabrid; sheaths glabrous, striate; ligule practically absent.

Inflorescence a narrow panicle, erect often somewhat curved, cylindrical, spiciform, dense, 10-20 cm. long; rachis slender, furrowed; lemmas very short, appressed, adnate to the axis. *Pedicel* very short, swollen at the tip. *Spikelets* narrowly crowded in little fascicles, erect, longer than the pedicels, olive-green, rather darker at the tip, sub-glabrous, smooth, 1.5 mm. long, obtuse at the tip; lower glume .3-1 mm. long, membranous or somewhat herbaceous, clasping, convex, strongly 3-nerved; upper glume 1.5 mm. long, convex, ovate-oblong, obtuse, 5-9-nerved. *Lower floret*; lemma .7-1.4 mm., membranous, herbaceous, ovate-obtuse, broader than the upper glume, very convex, 9-nerved; palea small, hyaline. *Upper floret* hermaphrodite; lemma .4-.9 mm., white, smooth, shining, sub-coriaceous, ovate-oblong, acute, convex on the back with involute margins.

Common in the hills.

7. HYMENACHNE Beauv.

Spikelets short-pedicelled, crowded in slender racemes which are erect, forming a close spikelike panicle, or narrowly ascending; spikelets narrowly lanceolate, acuminate, lower glume cuspidate, keeled, $1/3$ to $1/2$ as long as the spikelet, remote, a distinct stipe below the upper glume which is sheathing, 3-nerved cuspidate; lower floret barren; lemma 5-nerved, acuminate or cuspidate; upper floret hermaphrodite; lemma and palea membranous, margins of the lemma thin, not enrolled; palea not enclosed at the tip; grain oblong, tip contracted at maturity readily falling from the open lemma and palea.

Perennial aquatic or semi-aquatic grasses, decumbent at the base and rooting at the lower nodes, with rather short simple stems and long lanceolate blades, cordate, clasping at the base.

Tropics and sub-tropics.

Key to the species of *Hymenachne*.

Spikelets 4-6 mm. long.	..	..	1. <i>H. amplexicaulis</i> .
Spikelets up to 3 mm. long.	..	..	2. <i>H. assamica</i> .

1. *Hymenachne amplexicaulis* (Rudge) Nees, Agrost. Bras. (1829) 276. Syn. *Panicum amplexicaule* Rudge, Pl. Guian. I (1805) 21. (*Panicum myurus* H. B. K. of F. B. I.).

Short erect herbs from a creeping rootstock, spongy below, rooting at the lower nodes; culms erect, .6-2 m. high, striate, channelled, glabrous and smooth, nodes glabrous. *Leaf-blades* linear, tapering to a very fine point, 9-45 cm. long, up to 2 cm. broad, base rounded or cordate, smooth and glabrous, many nerved, margin thickened and minutely serrulate, teeth distant; sheaths very loose, smooth, glabrous, striate; margins ciliate; ligule a narrow membranous ring.

Inflorescence a thyrsoid panicle, up to 30 cm. long by 2.5 cm. broad, with erect, appressed branches; branches spiciform; rhachis stout, channelled and angled; branches also stout, very closely appressed; pedicels very short. *Spikelets* narrowly lanceolate-acuminate, up to 5 mm. long.

Glumes membranous; lower 2.5 mm. long, 1-nerved, keeled, cuspidate, scaberulous; upper glume 4.5 mm. long, 5-nerved, sheathing the rhachilla, cuspidate or curved, 3-ribbed, scaberulous. *Lower floret* barren; lemma 4.5-5 mm. long, lanceolate, membranous, 5-nerved tapering to an arista; palea $\frac{1}{3}$ as long; upper floret hermaphrodite; lemma ovate-obtuse, 3.2-3.5 mm. long, membranous at flowering time, dull white, 2-nerved, hardening at maturity, embracing the palea except at the tip; palea same shape and texture. *Lodicules* 2. *Stamens* 3, 1 mm. long. *Styles* 2, free. *Caryopsis* very small, oblong, top contracted. *Embryo* large, orbicular.

Common in wet places in the plains.

2. *Hymenachne assamica* Hitch. in Lingnan Sci. Journ. Vol. VII. (1929) 222. Syn. *Panicum assamicum* Hook. f. F. B. I. VII (1897) 40.

A slender grass ascending from a geniculate base, lower nodes rooting. *Culms* up to 45 cm. long, smooth and glabrous. *Leaves* lanceolate, acuminate, 5-10 cm. long, 3-5 mm. wide, finely nerved, sparsely hairy below, margins scarcely thicker, often ciliate on the rounded or subcordate base; sheaths rather loose, shorter than the internodes, smooth striate, margins ciliate, ligule a narrow membrane.

Inflorescence a spiciform panicle, cylindric, interrupted, 5 cm. long by 7 mm. broad; rhachis moderately stout, angled, scaberulous; branchlets short, closely appressed; pedicels stout, scaberulous. *Spikelets* narrowly ovate-acute, 3 mm. long. *Lower glume* orbicular, subapiculate, 3-nerved, clasping, 1.5 mm. long, hyaline, smooth and glabrous or very slightly scaberulous on the nerves; upper glume 1.5 mm. long, ovate-acute, strongly five-nerved, smooth and glabrous. *Lower floret* barren; lemma 2.75 mm. long, oblong-obtuse, sub-acute, 5-nerved, epaleate. *Upper floret* hermaphrodite; ovate-acute, faintly 3-nerved, thin, membranous, 2.5 mm. long; palea of the same shape and texture as the lemma, margins hyaline, incurved. *Stamens* 3, .75 mm. long. *Styles* 2. *Stigmas* plumose.

Common in wet places in the plains.

8. ICHNANTHUS Beauv.

Spikelets on short pedicels, 2-flowered, ovate-lanceolate, rounded or compressed laterally, articulate, but often persistent on the pedicels; glumes 2, membranous, often spreading, strongly nerved, sub-equal. *Lower floret* male or barren, lemma resembling the upper glume; palea often short. *Upper floret* caducous, hermaphrodite, much smaller, plane at right angles to the plane of the glumes, coriaceous, smooth, oblong or oblong-lanceolate, stipitate, with flattened rhachilla, with 2 lateral appendanges or scars, symmetrical, falciform or auriculate, often adnate to lower lemma; palea oblong. *Lodicules* 2. *Stamens* 3. *Ovary* with 2 styles free at the base; stigmas feathery, exerted at the summit of the floret. *Caryopsis* coriaceous, oblong, acute or acuminate, enclosed in the lemma which is often hardened.

Annual or perennial. *Culms* branching and rooting at the base. *Leaf-blades* broad or narrow. *Inflorescence* an elongated panicle, more or less branchy.

Key to the species of *Ichnanthus*.

Stems 30-60 cm. long, decumbent; leaves broadly lanceolate, amplexicaul.	..	..	1. <i>I. vicinus</i> .
Stems tufted, dwarf, 15-20 cm. long, hispid; leaves short, almost subulate.	..	..	2. <i>I. foliolosus</i> .

1. *Ichnanthus vicinus* (F. M. Bail.) Merr. in Enum. Philip. Fl. Plants I (1923) 70. Syn. *I. pallens* Munro in Benth. Fl. Hongk. (1861) 414.

Perennial. *Culms* 30-60 cm. high, weak, decumbent at the base, often branchy, more or less pubescent, with numerous nodes, close, the lower rooting, and often geniculate. *Leaf-blades* spreading, thin, flat, oblong-lanceolate, attenuate, acuminate; base amplexicaul, rounded or obliquely cordate, 7.5-15 cm. long, 1.25-2.5 cm. broad, scaberulous above, with closely appressed hairs below, nerves fine, the median scarcely stronger, margins hispid; sheaths lax, split, margins ciliate, striate, more or less pubescent; ligule obscure, hairy.

Inflorescence a sub-pyramidal panicle, emerging from the sheath of the uppermost leaf, often 1-sided, 6-22 cm. long, erect or nodding; rhachis angular, erect, glabrous; branches

erect or drooping, completely hispid or with white wool at the base, the lower spaced; pedicels shorter than the spikelets, asperulous. *Spikelets* lanceolate, acuminate, green, often more or less hairy, 4-5 mm. long; glumes spreading, herbaceous-membranous, the lower 2·5-3·3 mm. long, ovate-oblong, lanceolate, acuminate, sub-aristate, 3-5-nerved, often hispid, scabrous hispid at the summit of the keel; upper glume, 4-5 mm. long, acuminate, 5-7-nerved, often hispid, scabrous-hispid and with a few cilia on the keel. *Lower floret* barren or male; lemma 3·3-8 mm. long, oblong-lanceolate, acute or obtuse, consistency of the glumes, 5-nerved, keel scaberulous; palea 2·5-3·4 mm. long, oblong-obtuse, membranous, shortly ciliate on the keels, 2-nerved. *Upper floret* hermaphrodite, stipitate, at first in the same plane as the glumes, turned through 90° at maturity, caducous, stipes turbinate, not winged; lemma 2·2-3·4 mm. long, coriaceous, smooth; palea 2·2-3·4 mm. long, oblong-obtuse, margins scarcely inflexed, lodicules collateral, linear quadrangular. *Anthers* linear. *Ovary* elliptic.

Very common up to 5,000 ft.

2. *Ichnanthus foliolosus* Munro ex Hook. f. F. B. I. VII (1897) 61.

A dwarf annual. *Culms* fastigiately branched from the base, densely tufted, prostrate with tips erect or ascending, 15-20 cm. high, nodes hispidly hairy. *Leaf-blades* lanceolate, 3-4 mm. wide, 5 cm. long, often densely crowded, ascending or spreading, flat, rather rigid, tip blunt, margins hispidly ciliate, many-nerved and also tessellately nerved, base rounded, both surfaces covered with hispid hairs; sheaths short, striate hispid; ligule a rim of stiff, rigid hairs.

Inflorescence a sparingly branched panicle half immersed in the sheath of the uppermost leaf; branches ascending. *Spikelets* crowded on the scabrid or hispid branchlets, 4 mm. long, ovate-acuminate in profile; pedicels cupped, angled, scabrid, very short or twice the length of the spikelet, cupped at the tip. *Lower glume* 4·5 mm. long, lanceolate, 5-nerved, sometimes 2 faint nerves at the margins, keeled towards apex, where the median nerve is flattened and continued into a short

arista which is ciliate on the back; upper glume 4·5-5 mm. long, 7-nerved, similar in shape but not ciliate, membranous. *Lower floret* barren, epaleate; lemma same texture as the glume, 7-nerved, 4·5 mm. long. *Upper floret* hermaphrodite; lemma ovate, sub-acute, on a stipe provided with a two-lobed appendage, scars obscure, 2·3 mm. long, coriaceous, pale-yellow or whitish, not turned on the stipe though 90° as in *I. vicinus*, margins hyaline clasping the palea; palea same texture as lemma, ovate-obtuse, margins hyaline inflexed. *Anthers* linear 1 mm. long.

Will probably be found in the NAGA & LUSHAI HILLS.

9. PANICUM Linn.

Spikelets lanceolate to oblong, elliptic or orbicular in outline, symmetrical in profile, rarely somewhat oblique, falling entire, or almost so, from the often elongated pedicels of a decompound panicle, without a definite orientation towards the axis; lower floret male or barren, usually with a distinct palea, sometimes the latter absent; upper floret hermaphrodite. *Glumes* more or less herbaceous-membranous; the lower usually shorter than the upper (often by very much) rarely equalling it, usually with one or more nerves, or if very small, nerveless; upper as long as the spikelet, rounded on the back, 5-9-nerved. *Lower floret*; lemma very similar to the upper glume equally rounded and curved on the back (rarely less when the spikelets become oblique), 5- to 9-, rarely 3- or 11- nerved. *Palea* thinly membranous to sub-hyaline, sub-equal to the lemma, or more or less reduced, rarely suppressed. *Upper floret*; lemma sub-coriaceous to coriaceous with firm margins, obtuse to sub-acute, faintly nerved; palea sub-equal to the lemma and of similar substance, tightly embraced by the more or less involute margins of the lemma. *Lodicules* 2, broadly cuneate. *Styles* distinct; stigmas laterally exerted near the tip of the floret. *Grain* tightly enclosed by the hardened lemma and palea, dorsally compressed, biconvex to almost plano-convex; scutellum elliptic to ovate-elliptic, almost half as long as the grain; hilum sub-basal, punctiform.

Perennials or annuals rarely suffrutescent, of varying

habit and size; leaf-blades mostly linear to linear-lanceolate, but in some groups ovate or filiform or subulate; panicles usually much divided and at least temporarily open; spikelets usually loosely scattered, glabrous or hairy.

Key to the species of *Panicum*.

Leaf-blades linear to narrowly lanceolate, spikelets symmetrical.

Lemma of the upper floret finely transversely rugose. 1. *P. maximum*.

Lemma of the upper floret quite smooth.

Spikelets 4-5 mm. long; sharply acute, ovate to elliptic in back view.

Leaf sheaths hairy; spikelets persistent; panicle contracted. 2. *P. miliaceum*.

Leaf sheaths glabrous; spikelets deciduous; panicle effuse; pedicels longer than spikelets. 3. *P. incisum*.

Spikelets up to 3 mm. long, rarely to 4 mm. if so, with narrow lanceolate spikelets.

Spikelets 1.5 mm. long.

Dwarf grass; leaves narrow from a narrow base; upper glume 3-nerved; lower floret paleate. 4. *P. humile*.

Tall slender; leaves linear from a narrow cordate base; upper glume 5-nerved; lower floret epaleate. 5. *P. humidorum*.

Spikelets over 1.5 mm. long.

Lower glumes cuspidate-acuminate. 6. *P. trypheron*.

Lower glumes not cuspidate-acuminate.

Spikelets narrowly lanceolate to lanceolate-oblong, acute.

Lower glume orbicular, rotundate, or truncate, $1/6-1/4$ length of spikelet; spikelets 2.5-4 mm. long; panicle branches loose to closely spiculate.

Spikelets long narrowly lanceolate; leaf-blades broad, flat; culms spongy floating. 7. *P. paludosum*.

Spikelets lanceolate to lanceolate-oblong; leaf-blades narrow often involute; culms tough, rhizomatous. 8. *P. repens*.

Lower glume ovate, acute or obtuse,
 $\frac{1}{3}$ the length of the spikelet 3-5-
 nerved; spikelets 3 mm. long;
 panicle branches densely spiculate. 9. *P. auritum*.
 Spikelets oblong, ovate-oblong, to
 elliptic, acute or obtuse.

Lower glume $\frac{1}{4}$ - $\frac{1}{2}$ the length of
 the spikelet :—

Nodes and leaf-sheaths hairy;
 annual; transverse nerves in
 glumes; spikelets shortly pedi-
 celled or sub-sessile. .. 10. *P. cruciabile*.

Nodes and leaf-sheaths glab-
 rous:—

Annual; culms erect or geni-
 culate; leaf blades linear;
 lower floret with a palea :—

Spikelets persistent; panicle
 contracted; spikelets 2-3.5
 mm. long. .. 11. *P. miliare*.

Spikelets deciduous; panicle
 effuse; spikelets 2-3 mm.
 long. .. 12. *P. psilopodium*.

Perennial; culms ascending
 from a creeping base and
 rooting at the nodes; leaf-
 blades narrowly lanceolate,
 somewhat cordate; lower
 floret epaleate; upper glume
 persistent. .. 13. *P. khasianum*.

Lower glume $\frac{1}{2}$ - $\frac{3}{4}$ length of the
 spikelet:—

Spikelets obtuse; perennials :—

Spikelets 2-2.5 mm. long;
 leaf-blades broad:—

Lower floret epaleate; leaf
 margins pectinately ciliate;
 upper glume fugacious. .. 14. *P. montanum*.

Lower floret paleate. .. 15. *P. sarmentosum*.

Spikelets acute. .. 16. *P. acroanthum*.

Leaf-blades lanceolate to ovate; base cordate;
 spikelets oblique. .. 17. *P. brevifolium*.

1. *Panicum maximum* Jacq. Ic. Pl. Rar. I. 2. tab.

13. Collect. Bot. I (1786) 76.

Perennial, tufted; innovation shoots intravaginal;
 rhizome short, sometimes very stout; culms erect or genicu-

late, robust, usually tall, up to 3 m. long, compressed below, glabrous on the lower part, more or less hirsute, usually 3- to 6-noded, sub-simple or more or less branched, branches erect, upper internodes exerted. *Leaves* glabrous or softly hairy or coarse hirsute with tubercle-based hairs, blades linear to lanceolate linear from a contracted and rounded or attenuate base, long tapering to a fine (sometimes convolute and filiform) point, 30-60 cm. long, 5 mm.-2 cm. broad, rarely broader, flat, minutely tomentose at the junction with the sheath; midrib rather short, whitish; sheaths rather firm, the lower compressed, striate, nodes glabrous, pubescent or bearded; ligules membranous, very short, ciliate and often with a dense beard behind.

Inflorescence a panicle erect or nodding, contracted or effuse and lax, decompound, from 15 to over 30 cm. long; axis slender, angular, glabrous, smooth or scaberulous above; lower branches whorled, sub-erect or spreading, rather distant, up to 15 cm. long, divided almost from the base, or undivided, from 2.5-6 cm., filiform, scaberulous above, smooth below, glabrous except at the often minutely tomentose or pubescent callous base; pedicels fascicled, 3-2-nate or the upper solitary, very unequal, very short to several times longer than the spikelet, capillary, flexuous, scabrid. *Spikelets* oblong, sub-obtuse or obtuse, somewhat turgid, 3.2-3.8 mm. long, light-green, sometimes tinged with purple, glabrous, rarely puberulous; lower glume rounded 1.8-2.4 mm. long, sub-hyaline, faintly 3-nerved to nerveless; upper oblong, acute or obtuse, 3-3.5 mm. long, membranous, 5-nerved. *Lower floret* male; lemma very similar to and very slightly shorter than the upper glume; palea oblong, obtuse. *Upper floret* hermaphrodite, equalling the lower or scarcely shorter, oblong; obtuse; lemma 5-nerved, finely transversely rugose; anthers 1.25-1.8 mm. long, grain over 1.25 mm. long.

A valuable fodder grass. Introduced from Africa and run wild in some places.

2. *Panicum miliaceum* Linn. Sp. Pl. (1753) 58.

An annual herb with fibrous roots, culms 1.5-2 m. tall, procumbent at the base, tufted, stout, round, sub-angular or

compressed, pubescent at the base and on the nodes, leafy to the panicle. *Leaf-blades* linear, acuminate, slightly rounded at the base, truncate or rarely cordate, flat, soft or hispid, 30-50 cm. long, 1-2.5 cm. broad, margins slightly scaberulous with a few long cilia with swollen bases, principal nerves 9-11, the median the most distinct; sheaths split, lax, sub-compressed, striate, hairy with tubercle-based hairs; ligules hairy.

Inflorescence thyrsiform, often decurved, sometimes very dense in cultivated states, 15-40 cm. long; rhachis scarcely thicker than the branches and like them angular, scabrid or hispid; branches long, sub-erect, bare at the base, divided at the summit; pedicels capillary, longer or shorter than the spikelets. *Spikelets* green or ovate-acute, turgid, glabrous, 4-5 mm. long. *Lower glume* 2-3.2 mm. long, convex, clasping, broadly ovate-acute or acuminate, strongly 5-7-nerved; upper glume 4-5 mm. long, broadly ovate-acuminate, cuspidate, very convex 7-11-nerved. *Lower floret* barren, lemma 3.7-4.7 mm. long, like the upper glume; palea reduced or absent, narrow, thin, conduplicate, with two delicate nerves. *Upper floret* hermaphrodite, sessile; lemma 3.5-4.5 mm. long, smooth, shining, crustaceous, yellow or brownish, ovate, attenuate at the apex, with inflexed margins, palea 3.5-4.5 mm. long, of the same texture as the lemma, convex, with margins inflexed. *Ovary* with very short styles; stigmas purple. *Anthers* linear. *Caryopsis* almost orbicular, plano-convex, white.

Run wild in the plains.

3. *Panicum incisum* Munro ex Clarke in Jour. Linn. Soc. XXV (1890) 84, tab. 33.

Perennial. *Culms* 30-60 cm. tall, extensively creeping at the base, finally erect, quite glabrous, short noded, leafy to the top. *Leaf-blades* long, linear-lanceolate from a contracted base, finely acuminate, rather rigid, many-nerved, both surfaces smooth and glabrous, margin scarcely thickened, scaberulous, occasionally a few cilia near the narrowed base; sheath glabrous, smooth, striate, overlapping; ligule elongate-oblong, lacerate, scarious.

Inflorescence issuing from the uppermost leaf sheath, very effuse, lax; principal axis short, angled, scaberulous; branchlets long, capillary, scaberulous, sparingly divided; branchlets capillary, scaberulous; pedicels much longer than the spikelets, swollen at the tip to form a minute cup. *Spikelets* up to 4.5 mm. long, remote, solitary, elliptic-acuminate in profile. *Glumes* distant on a stout, inarticulate rhachilla; lower glume broadly ovate-elliptic, acute, 3-4-nerved, herbaceous, 2.5 mm. long; upper glume ovate-acuminate, clasping, membranous, 5-nerved, 4.25 mm. long; lower floret male; lemma membranous, 4 mm. long, 7-nerved; palea small, 1 mm. long; upper floret hermaphrodite; lemma 3 mm. long, smooth, subcoriaceous, brown, broadly ovate-acute or acuminate, longitudinally obscurely striate, margins narrowly inflexed; palea narrowly ovate-oblong, 2-keeled margins inflexed, 2.5 mm. long of the same texture as the lemma.

Very common in Upper Assam in clearings in the forest.

4. *Panicum humile* Nees ex Steud. Syn. Pl. Glum. (1854) 84.

Annual, tufted, 15-45 cm. high, sometimes quite dwarf. *Culms* erect or geniculate, slender, glabrous and very smooth, often purplish, branched from all or most nodes, with the branches often fascicled and very unequal. *Leaf-blades* linear from a slightly rounded base, tapering to a slender point, 2-15 cm. long, 3-5 mm. broad, flat, flaccid, quite glabrous, slightly scaberulous along the margins, midrib distinct, lateral nerves (about 3 on each side) fine or slightly prominent below, less so or hardly at all above; sheaths somewhat loose, often hirsute, striate, glabrous except at the upper margins which are sometimes delicately ciliate; ligule a minute, ciliolate rim.

Panicle open and very loose, up to 10 cm. long by 5 cm. broad, quite glabrous; branches and branchlets very slender, sub-rigid, scaberulous upwards; pedicels slightly thickened at the tips; in dwarf specimens the panicle much smaller or contracted. *Spikelets* 1.5 mm. long, acutely acuminate when closed, then more or less, but never widely gaping, greenish or more often tinged with purple. *Lower glume* obliquely

lanceolate, acutely acuminate up to 1 mm. long, 3-nerved. *Upper glume* similar but longer, wider, 3- to sub- 5- nerved. *Lower floret* barren; lemma similar to the upper glume but somewhat shorter and paler, 5-nerved; palea distinctly shorter than the lemma, empty. *Upper floret* hermaphrodite, oblong, obtuse, 1.5 mm. long, whitish, glossy and smooth; lemma and palea crustaceous; anthers not quite 1 mm. long, purplish.

Common in the plains.

5. *Panicum humidorum* Ham. in Wall. Cat. n. 8721.

A perennial grass, often gregarious in water. *The culms* procumbent and creeping below, rooting at the nodes, finally erect, tall, slender, up to 2 m. tall; culms and nodes smooth and glabrous. *Leaf-blades* flat linear, smooth and glabrous, sometimes slightly scaberulous, margins minutely scabrid. from a narrow cordate base; sheaths smooth and glabrous, striate; ligule a very narrow membrane, erose or lacerate at the top.

Inflorescence a panicle, contracted or effuse; rhachis-branches and branchlets capillary, scabrous, angled. *Spikelets* very small. 2 mm. long or sometimes only 1.5 mm., often purple. *Lower glume* 1 mm. long, 3 nerved, ovate-lanceolate, obtuse. *Upper glume* 1.5 m. long, lanceolate, obscurely 5-nerved. *Lower floret*; lemma 5-nerved, 1.5 mm. long, epaleate. *Upper floret* hermaphrodite; lemma ovate, 1.25 mm. long, chartaceous, smooth; palea almost as long and enclosed by the lemma.

Common in marshy land.

6. *Panicum trypheron* Schult. Mant. II (1824) 244.

An annual. *Culms* 15-90 cm. tall, tufted, erect or geniculate at the base, leafy. at the base principally, stout or slender, with glabrous nodes, rarely rooting. *Leaf-blades* sub-erect, narrow, linear, acuminate, base narrow, often flat. softly hairy or hirsute, at least on the lower surface, 7-25 cm.

long, 4-6 mm. broad, margins almost smooth; sheaths glabrous or hairy; ligule short, fimbriate.

Inflorescence a panicle, erect or nodding, broadly oblong, very effuse, very lax, 10-25 cm. long, often as broad; rhachis slender, scaberulous; branches very long, rigid, filiform, scaberulous, divaricate, flexuous, bearing few spikelets, the lower fasciculate. *Pedicels* scaberulous, capillary, often villous, swollen at the tip 2.5-4 mm. long. *Spikelets* very distant, cvoid, acuminate, glabrous, green, yellow or purple, 2.5-3.3 mm. long, glumes strongly nerved. *Lower glume* 1.6-2.5 mm. long, broadly ovate, cuspidate, finely acuminate, 5-nerved. *Upper glume* 2.5-3.5 mm. broadly ovate, recurved, sub-cuspidate, 7-9-nerved. *Lower floret* barren; lemma 2.3-3.3 mm. long, concave, broadly ovate, sub-cuspidate, 7-nerved; palea white, hyaline, linear-oblong or oblong-elliptic-obtuse. *Upper floret* sessile, lemma 2-3 mm. long, smooth, shining, coriaceous, of variable width, oblong-obtuse or oblong, varying from pure white to greenish-brown, dorsally convex, 3-5-nerved, margins narrowly inflexed; palea of the same texture as the lemma.

Plains of the Lower Assam Valley.

7. *Panicum paludosum* Roxb. Hort. Beng. (1814)

8.

A perennial, base climbing or floating, rooting at the nodes, spongy. *Culms* 60-90 cm. long, erect or ascending, simple or branched, leafy to below the panicle, with glabrous nodes. *Leaf-blades* linear or ensiform, sharp, flat, rounded or sub-cordate at the base, somewhat coriaceous, glabrous, 15-30 cm. long, 6-15 mm. broad, margins scaberulous, many-nerved, fine; sheaths lax, striate, glabrous; ligule reduced to a ring of hairs.

Inflorescence at first contracted then spreading, 10-25 cm. long, often almost as broad; rhachis scarcely distinct from the branches; branches robust, branched at the base, fasciculate below, trigonous, scabrous; pedicels angular, scaberulous, about the length of the spikelet, scarcely inflated at the tip. *Spikelets* almost parallel to the axis, singly or in pairs, ovate-lanceolate, acuminate, green, 3-4 mm. long.

Lower glume .6-.8 mm. long, clasping, orbicular or kidney-shaped, hyaline, white, obscurely nerved or nerveless. *Upper glume* 3-4 mm. long, broadly ovate-acuminate, strongly 7-9-nerved. *Lower floret* neuter or male, rarely hermaphrodite; lemma 3-4 mm. long, ovate-lanceolate, acuminate, 9-nerved; palea small or absent, linear oblong, hyaline. *Upper floret* hermaphrodite, sessile; lemma 2.5-3.5 mm. long, smooth, shining, ivory or pale-yellow, somewhat coriaceous, dorsally convex, narrowly oblong-acute or acuminate, margins very broadly involute; palea 2.5-3.5 mm. of the same texture as the lemma, narrowly oblong, with inturned margins and auricled at the base.

In marshes in the plains and up to 4,000 ft. in the hills.

8. *Panicum repens* Linn. Sp. Pl. Ed. 2. (1762) 87.

Perennial. *Rhizome* robust, elongated. *Culms* .5-1.2 m. long, stoloniferous at the base, erect or ascending, simple or branched at the base, striate, with numerous nodes, glabrous, the lowest rooting. *Leaf-blades* distichous, erect, stiff, rigid, rather coriaceous, linear-lanceolate, acuminate, rounded or cordate at the base, flat or rolled, glaucous, glabrous or hairy on the upper surface, 5-15 cm. long; margins cartilaginous, smooth or tubercled towards the base, many-nerved; nerves fine; sheaths with long ciliate margins principally towards the mouth; ligule a narrow coriaceous ring, hairy.

Inflorescence an erect panicle, often more or less contracted, irregularly branched, 7.5-20 cm. long. *Branches* numerous, erect, very fine, angular, somewhat scabrid, solitary, or 2-3-nate; pedicels short, swollen into a cup at the tip. *Spikelets* erect, solitary or in pairs, ovate-lanceolate, sharp, pale, 2.5-3.5 mm. long. *Lower glume* .5-.7 mm. long, membranous, clasping, broad, suborbicular or sometimes sub-acute, nerveless or faintly 3-5-nerved. *Upper glume* 2.5-3.5 mm. long, ovate-acute, convex, membranous, except the tip, 5-7- sometimes 9-nerved. *Lower floret* male or neuter; lemma 2.5-3.5 mm. long, ovate-acute, concave, obscurely 7-9-nerved; palea often 2.2-3 mm. long, membranous, very thin, white, ovate, with inflexed margins; stamens short. *Upper floret*, hermaphrodite, with a short

broad stipe; lemma 2.3 mm. long, smooth, shining, almost white, slightly coriaceous, dorsally convex, ovate-oblong, acute, with broadly inflexed margins, finely 7-nerved; palea 2.3 mm. long, same texture as the lemma, oblong-acute, margins thinly inflexed. *Stamens* long.

Rather rare. Usually found on dry slopes.

9 *Panicum auritum* Presl ex Nees, Agros. Bras. (1829) 116.

A perennial. *Culms* stout up to 2 m. high, erect, soft, smooth and glabrous; nodes glabrous. *Leaf-blades* linear-lanceolate from a cordate base, 20-40 cm. long by 2-4 cm. broad, tapering to a fine point, many nerved, midrib distinct, smooth and glabrous; margins slightly thicker and minutely serrulate; sheaths rather loose, striate, smooth and glabrous, densely ciliate on the margin; ligule a narrow, membranous rim.

Inflorescence a panicle which is usually contracted, 20-45 cm. long; branches somewhat erect; branchlets hairy, numerous, crowded. *Spikelets* seated on scaberulous pedicels which are shorter than the spikelet; rhachis angled, scabrid. *Spikelets* 2.5-3 mm. long, lanceolate in profile. *Lower glume* orbicular, obtuse, clasping the base of the spikelet 1.25 mm. long, 3-nerved. *Upper glume* ovate-lanceolate when flattened, tip acute, 5-nerved, 2.5 to about 3 mm. long. *Lower floret* male, lemma 2.5 mm. long, ovate-lanceolate, tip acute, 5-nerved; palea 1.5 mm. hyaline, oblong, tip acute. *Upper floret* hermaphrodite; lemma white, thinly coriaceous, very faintly 5-nerved; palea similar in texture and shape 1.75 mm. long. *Anthers* 3, 1.75 mm. long.

Very common in the plains.

10. *Panicum cruciabile* Chase in Journ. Arn. Arbor. XX, 3 (1939) 309. Syn. *P. reticulatum* Thw. in Trimen, Jour. Bot. XXIII (1885) 271; *P. caesium* Nees in Hook. Kew Journ. II (1850) 97.

Annual. *Culms* erect from the root, stout, 60 cm.-1 m. tall, densely tufted. *Leaf-blades* linear, 15-25 cm. long,

·6-1·25 cm. broad, tapering to a fine point, sub-cordate, many-nerved, both surfaces more or less covered with white hairs; margin scarcely thickened, minutely toothed with long cilia at the base; sheaths overlapping, loose, striate, compressed, clothed with long, white spreading, deciduous hairs from tubercle bases (even if hairs have fallen the sheaths are still conspicuous from the tubercles which remain); ligule a ridge of hairs.

Inflorescence a large, sub-thyriform, erect panicle, 25-45 cm. long, much branched, lower branches long, sub-fascicled; rhachis distinctly angled, stout, scaberulous; branches and branchlets capillary. *Spikelets* sub-sessile, solitary or 2-nate, broadly ovoid, turgid, 2-2·5 mm. long, nerves of the glumes anastomosing, a feature which can be made out with a hand lens. *Lower glume* membranous, 1·5 mm. long, clasping, 5-6-7-nerved, nerves anastomosing. *Upper glume* 2-2·5 mm. long, ovate-acute, finely 7-9- or more-nerved, nerves usually anastomosing. *Lower floret* male; lemma ovate-acute, membranous, 7-9 or more nerved, 2-2·5 mm. long; palea oblong, hyaline, 2 mm. long. *Upper floret* hermaphrodite; lemma 2 mm. long, or less, shining, coriaceous, ovate-acute, pale yellow or brownish, margins narrowly incurved; palea ovate, of the same texture as the lemma, margins sharply incurved.

CACHAR, SYLHET & DARRANG.

For a discussion of the reasons which have led to the rejection of *P. tuberculatum* Thw. and *P. caesium* Nees, see Chase loc. cit.

11. *Panicum miliare* Lamk. Ill. Gen. I. (1791) 173.

An annual. *Culms* ·3-1 m. tall, tufted, erect or geniculate at the base, simple or branched, rather slender, glabrous, leafy to just below the panicle. *Leaves* erect, linear, acuminate, flat, flaccid, rounded and contracted at the base, glabrous or with scattered hairs, 30-50 cm. long, 4-25 mm. broad; margins smooth and very obscurely scaberulous; nerves firm; sheaths loose, ciliate or with a few tubercle-based hairs; ligule very short, truncate, ciliate.

Inflorescence an oblong panicle, decompound, contracted,

erect or nodding, narrower, 5-30 cm. long; rhachis slender, striate, scarcely scaberulous; branches slender, filiform, erect, angular, scaberulous, sparingly branched, the lower extended; pedicels very unequal, reaching 1.5 cm. in length, but are usually short. *Spikelets* solitary or in pairs, subtergite, rather flattened, ellipsoid, or ovate-acute, glabrous, green or purplish, 2-3.5 mm. long. *Lower glume* .7-1.7 mm. long, clasping, broadly ovate, acute or acuminate, 3-5-nerved, the nerves often anastomosing. *Upper glume* 2-3.5 mm. ovate orbicular, sub-acuminate, very concave 11-13-nerved. *Lower floret* neuter; lemma 2-3.5 mm. long, ovate sub-acuminate, 9-nerved; palea 1.7-3.2 mm. long, linear oblong, thin, 2-keeled. *Upper floret* hermaphrodite, sessile; lemma 1.8-3.2 mm. long, shining, smooth, cartilaginous, yellowish or brownish, oblong, acute, or broadly ovate acute, often with 3-5 dorsal striations, dorsally convex with margins broadly inflexed; palea oblong-elliptic, with margins much inflexed.

Naturalised in the plains.

12. *Panicum psilopodium* Trin. Gram. Panic. (1826) 217.

An annual. *Culms* 30-60 cm. long, simple or branched, usually leafy up to the panicle, often tufted, smooth and glabrous. *Leaf-blades* 7.5-30 cm. long, 4-8 mm. broad, flat, linear, tapering to a very sharp point, base rounded, smooth and glabrous; margins cartilaginous; midrib prominent beneath, in young specimens with rather long cilia towards the base; leaf-sheaths rather loose, compressed, smooth glabrous and striate in well-grown and old plants, sparsely hairy in young and depauperate forms; ligule a lacerate membranous ring.

Inflorescence a panicle 5-20 cm. long, branches capillary, angled, scaberulous, lower long naked at the base, finally spreading; pedicels usually longer than the spikelets, swollen into a little cup at the tip. *Spikelets* in pairs or solitary, ovate-lanceolate or ovate-oblong in shape, rarely exceeding 3 mm. in length, glabrous, 2-3 mm. long, rather flattened, often purplish. *Lower glume* orbicular, rotund, apiculate, clasping the base of the spikelet, 1 mm. long,

3-5-nerved, nerves anastomosing, often half the glume hyaline. *Upper glume* length of the spikelet, ovate-oblong or ovate-lanceolate, tip obtuse, 11-nerved, membranous. *Lower floret* barren; lemma as long as the spikelet, same texture as upper glume, 9-nerved; palea narrowly oblong, hyaline, 2-keeled; margin inflexed. *Upper floret* hermaphrodite; lemma oblong-obtuse, apiculate, pale yellow, coriaceous, shining, margins inflexed; palea slightly shorter.

Common in the plains.

13. *Panicum khasianum* Munro ex Hook. f. F. B, I. VII (1897) 54.

A perennial grass. *Stem* prostrate and creeping below, finally erect, reaching 1-2 m. high; nodes smooth and glabrous. *Culms* also somewhat glabrous, striate, polished. *Leaf-blades* lanceolate or linear-lanceolate, tapering to a fine point and joined to the sheath by a cordate base, 15-30 cm. long, 1·8-3 cm. broad, glabrous, hairy, or sub-scabrid, many-nerved; margin slightly thickened and minutely ciliate; sheaths rather loose, striate, hispidly hairy or glabrous, mouth bearded, margins ciliate or not; ligule very narrow, ciliate.

Inflorescence a decompound panicle, 15-30 cm. long and often as broad; rhachis branches and branchlets scaberrulous; branches up to 15 cm. long. *Spikelets* 2-2·5 mm. long, ellipsoid-subacute, seated on short or long pedicels. *Lower glume* ·75 mm. long, deltoid in outline, obscurely nerved. *Upper glume* as long as the spikelet, membranous, ovate-lanceolate, 3-4-5-nerved, persistent. *Lower floret*; lemma membranous, 5-nerved, epaleate. *Upper floret* hermaphrodite; lemma chartaceous, almost mucronate, pubescent, woolly at the tip. palea of the same texture, almost as long as the lemma and embraced by it. *Anthers* 3, linear.

KHASI & JAINTIA HILLS in marshes and in the NAGA HILLS in forest at 4,000 ft.

14. *Panicum montanum* Roxb. Fl. Ind. I. (1820) 313.

Perennial, base somewhat woody. *Culms* ·8-1·2 m. tall, erect, hard, solid, smooth with rigid branches, nodes 5-12 cm.

apart, glabrous. *Leaf-blades* spreading or deflexed, flat, elongate, lanceolate, acuminate, broad and cordate at the base, thin, smooth or scaberulous, glabrous or ciliate at the base principally below, 12-18 cm. long, 1-3 cm. broad, many nerved, margins scaberulous, ciliate; sheaths shorter than the internodes, glabrous or pubescent, hairy in the throat; ligules obscure, furnished with long soft hairs.

Inflorescence a lax panicle, erect, spreading, 20-30 cm. long; rhachis generally straight, sometimes glandular, somewhat scabrous at the top; branches numerous, straight, filiform, scabrous, the lower verticillate, straight and not branched, equalling the panicle in length, the upper opposite or alternate; pedicels very long, capillary, smooth, erect, swollen at the tips. *Spikelets* distant, ellipsoid or oblong, obtuse or sub-acute, glabrous or slightly pubescent, 1.5-2.5 mm. long. *Lower glume* 1.1-1.9 mm. long, ovate-sub-acute, embracing the spikelet, 5-nerved, sparsely hairy. *Upper glume* 1.5-2.5 mm. long, concave, sub-orbicular, ovate-obtuse, rounded at the summit, caducous, glabrous or with sparse hairs strongly 5-nerved. *Lower floret* barren; lemma 1.3-2.3 mm. long, ovate-obtuse, sometimes narrower than the upper glume, 5-nerved, epaleate. *Upper floret* hermaphrodite, shortly stipitate; lemma 1.3-2.3 mm. long, smooth, shining, coriaceous, ovoid, sub-acute, yellowish or pale-brown, rounded on the back, obscurely striate, a little shorter than the spikelet, with margins slightly inflexed; palea 1.2-2.2 mm. long, oblong-acute, of the same texture as the lemma.

Very common.

15. *Panicum sarmentosum* Roxb. Fl. Ind. I (1820) 308.

A rambling perennial. *Culms* decumbent, branched, swollen and more or less rooting at the nodes, scrambling over vegetation and may reach 15 m. in length. *Leaf-blades* spreading, linear-lanceolate, finely acuminate, narrow, rounded or sub-cordate at the base, smooth, hairy at least on the under-surface, with scaberulous margins, 30-40 cm. long, 1-3 cm. broad, many-nerved, median nerve the strongest;

sheaths somewhat loose, striate, glabrous or with scattered hairs; ligule a ridge of hairs.

Inflorescence a spreading panicle, ovoid or pyramidal, laxly branched, 8-35 cm. long; rhachis cylindrical below, angled at the summit, pubescent in the axils; branches capillary, sub-verticillate, spreading or erect, long or short; pedicels short, swollen at the tips. *Spikelets* ovoid-obtuse, ciliolate, 1.3-2 mm. long. *Lower glume* .4-1 mm. long, embracing the spikelet, ovate-oblong, obtuse or sub-acute, 3-5-nerved. *Upper glume* 1.3-2 mm. long, broader than the lower, ovate-sub-orbicular, rounded or slightly pointed at the apex, 5-nerved, pubescent at the apex. *Lower floret* barren; lemma 1.3-2 mm. long, broadly ovate-sub-orbicular, 5-nerved, pubescent at the apex; palea narrower, .9-1.3 mm., oblong, hyaline, margins fimbriate, 2-nerved. *Upper floret* hermaphrodite; lemma 1.3-2 mm. long, coriaceous, smooth, shining, ovate-oblong, sub-acute, rounded on the back, margins clasping; palea 1.3-2 mm. long, more obtuse, oblong, margins folding inwards. *Caryopsis* oblong.

Common in Sal forest.

16. *Panicum acroanthum* Steud. Syn. Pl. Glum. (1854) 87.

A perennial grass with culms up to 90 cm. tall, erect, geniculate at the base, leafy to the panicle, with glabrous nodes. *Leaf-blades* narrow, linear, acuminate, narrowed at the base, flat, thin, glabrous; sheaths glabrous, ciliate on the margins; ligule hairy.

Inflorescence a large spreading panicle, lax flowered, 7-12 cm. long and as broad; branches sub-solitary, spreading, with capillary branchlets; pedicels somewhat shorter or longer than the spikelets; branches and branchlets smooth or minutely scaberulous. *Spikelets* few in number, often in pairs. ovate-oblong, acute, brownish or greenish, usually covered with a sparse pubescence, 2.2 mm. long. *Lower glume* .6-.7 mm. long, membranous, ovate, obtuse or sub-acute, 1-3-nerved. *Upper glume* 2.8 mm. long, membranous, sub-acute, 5-nerved. *Lower floret* empty; lemma 2 mm. long, mem-

branous, ovate, acute, 5-nerved; palea absent. *Upper floret* hermaphrodite; lemma 2 mm. long, shining, smooth, coriaceous, pale-yellow, elliptic-oblong, sub-acute; palea oblong, acute, with inflexed margins.

Collected by Griffith in the MISHIMI HILLS.

17. *Panicum brevifolium* Linn. Sp. Pl. (1753) 59, not of Roxb. Syn. P. ovalifolium Poir. Encycl. Suppl. IV (1816) 279.

Culms 2.1-2 m. long, rooting for part of their length, slender, geniculate, finally ascending, sparingly branched, striate, often purplish, glabrous even on the nodes, often leafy to the base of the inflorescence. *Leaf-blades* spreading, narrow, membranous, ovate-lanceolate, acuminate, cordate-amplexicaul at the base, glabrous or with scattered hairs, 3-10 cm. long, 1-3 cm. broad; margins scaberulous, ciliate at the base; nerves membranous, the median nerve more prominent below; sheaths glabrous or ciliate; ligule very short, ciliate.

Inflorescence a panicle, spreading, broadly oblong or ovate, sometimes obovoid, branches many 7.5-12 cm. long rhachis bare or furnished with scattered hairs, sometimes villous; branchlets numerous, spreading, alternate or the lower verticillate, capillary, smooth or scaberulous; pedicels capillary, equalling the spikelets in length or 2-3 times as long. *Spikelets* few solitary, somewhat gibbous, ovate or oblong, subacute, often purplish, pubescent or sometimes bristly on the margins of the panicles with long white hairs. 1.5-2.5 mm. long. *Lower glume* 1.3-2.3 mm. long, membranous, almost flat, ovate-oblong, obtuse, faintly 3-5-nerved. *Upper glume* 1.5-2.5 mm. long, hemispheric, ovate-acuminate, larger than the lower, 5-nerved, pubescent or villous, often persistent. *Lower floret* male; lemma 1.5-2.5 mm. long, membranous, almost flat, ovate-oblong, obtuse, 5-nerved; palea narrow, oblong. *Upper floret* hermaphrodite, sessile; lemma 1.2-2.5 mm. long, smooth, shining, sub-coriaceous, ovate-oblong, pointed, dorsally convex, obscurely carinate, with narrowly inturned margins; palea of the same texture, ovate-oblong, flat on the back, margins inturned.

Very common in UPPER ASSAM and in the hills up to 4,000 ft.

10. CYRTOCOCUM Stapf.

Spikelets obliquely obovate to semi-obovate, gibbous, awnless, much compressed laterally, keeled, falling entire from the pedicels, arranged in loose and open, or contracted and dense panicles. *Florets* 2; lower barren and with or without a palea, upper hermaphrodite as long as or nearly as long as the lower. *Glumes* unequal or nearly equal, thinly membranous, 3-5-nerved. *Lower floret*; lemma as long as the spikelet similar to the upper glume; palea if present narrow; upper floret, lemma narrowly boat-shaped, gibbous, papery to coriaceous, with rigidly, narrowly involute margins, obscurely 5-nerved; palea very narrow, convex on the back, as long as the lemma and similar in texture. *Lodicules* 2. *Stamens* 3.

Perennial grasses with slender, geniculate culms ascending from a decumbent or creeping base; leaf-blades linear-lanceolate to lanceolate, or linear, flat; ligule membranous; spikelets brown or greenish brown.

Key to the species of *Cyrtochocum*.

Pedicels short, rarely as long as the spikelets.

Leaves 1.25-4 cm. long, culms slender; panicle up to 6.5 cm. long; spikelets few, hispid. 1. *C. trigonum*.

Leaves 5-18 cm. long; culms rather stout; panicle 6.5-20 cm. long; branchlets many; spikelets numerous. .. 2. *C. oxyphyllum*.

Pedicels longer than the spikelets.

Lower lemma obtuse.

Spikelets 2.25-2.5 mm. (over 1.5 mm.) long. .. 3. *C. patens*.

Spikelets under 1.5 mm. long.

Panicle very lax, pedicels fairly long. .. 4. *C. accrescens*.

Panicle contracted, pedicels short. .. 5. *C. radicans*.

Lower lemma and glumes acute or cuspidate. 6. *C. longipes*.

1. *Cyrtochocum trigonum* A. Camus in Bull. Mus. Nat. Hist. Paris (1921) 118. Syn. *Panicum trigonum* Retz. Obs. III (1783) 9.

Perennial. *Culms* 15-45 cm. high, decumbent, creeping and branchy at the base; branches erect, slender or filiform, glabrous; nodes glabrous, the lower emitting very long, filiform, sub-solitary roots; leaf-blades narrow, flat, linear-lanceolate,

acuminate, contracted at the base, glabrous or with long scattered hairs, 1-8 cm. long, 2-8 mm. broad; margins almost smooth; nerves fine; sheaths glabrous or with ciliate margins especially near the throat; ligule rounded.

Inflorescence a short, stout panicle, very variable, contracted, upright, lax; axis often flexuous, smooth; branches sub-erect, angular, glabrous, smooth, often flexuous, 2.5-3 cm. long, with few spikelets; pedicels short, smooth. *Spikelets* gibbous, laterally compressed, hispid, 1.5-2 mm. long; lower glume .75-1 mm. long, membranous, broadly ovate-acute or cuspidate, 5-nerved, pubescent or hispid; upper glume 1.3-1.8 mm. long, helmet-shaped, obtuse, 3-nerved, pubescent. *Lower floret*; lemma 1.5-2 mm. long, obovate oblong, 5-nerved, pubescent or hispid; palea rudimentary or absent. *Upper floret* hermaphrodite, sessile; lemma 1.5-2 mm. long, shining, finely punctate, coriaceous, pale, semilunar in profile, shortly attenuate at the apex, laterally compressed, back rounded, margins not or broadly incurved; palea 1.5-2 mm. long, of the same texture as the lemma, oblong, rounded on the back.

GOALPARA.

2. *Cyrtococcum oxyphyllum* Stapf in Hook. Ic. Pl. Sub. tab. 3096 (1922). Syn. *Panicum pilipes* Nees et Arn. ex Buese in Miq. Pl. Jungh. III (1854) 376.

A loosely rambling perennial. *Culms* ascending from a creeping base and rooting at the lower nodes, 20-60 cm. or more high, slender, terete, branched at the base, many-noded, glabrous and smooth. *Leaves* scattered; blades linear-lanceolate, finely acuminate, contracted or rounded at the base, 4-20 cm. long, 4-20 mm. wide, pubescent to pilose or glabrous, minutely scaberulous on the margins; sheaths at length shorter than the internodes, shortly hairy or more or less glabrous; ligule very short truncate.

Panicle contracted, lanceolate to narrowly ovate, 4-18 cm. long; rhachis asperulous; branches erect or spreading, naked at the base, divided above, with the branchlets short and close together, filiform, usually with long white scattered hairs; pedicels very short. *Spikelets* crowded, broadly and

obliquely obovate, obtuse, 1.6-2 mm. long, brown, glabrous. *Glumes* acute or obtuse, 3-nerved; lower ovate, 1.1-1.6 mm. long; upper elliptic or semi-elliptic in sideview, 1.5-1.8 mm. long. *Lower floret*; lemma broadly elliptic and obtuse when flattened, 3-5-nerved. *Upper floret*; lemma coriaceous, smooth and shining with a brown scar or crest at the apex.

Very common up to 4,000 ft.

3. *Cyrtochocum patens* A. Camus in Bull. Mus. Nat. Hist. Paris, XXVII (1921) 118. Syn. *Panicum patens* Linn. Sp. Pl. (1753) 86.

Perennial herb. *Culms* 30-60 cm. long, rooting at the base, branchy, slender, terete, delicately striate, nodes glabrous, somewhat geniculate, the lower emitting very long, solitary roots. *Leaf-blades* narrow, spreading flat, from broadly ovate to linear-lanceolate, finely acuminate, glabrous or ciliate below, with tubercle-based hairs, 3-15 cm. long, by 6-8 mm. wide, margins hispid, hairs from tubercular bases; sheaths ciliate on the margins at the throat; ligule membranous, short obtuse.

Inflorescence a lax panicle, often nodding, spreading or contracted; branches spreading, long, flexuous, the lower verticillate, the upper solitary or in pairs; branchlets very long, distant, often spreading; pedicels capillary, often long, glabrous. *Spikelets* almost round, green, reddish or brown, 1.8 mm. long; glumes herbaceous, membranous; lower glume .6-1.2 mm. long, cordate, ovate obtuse or scarcely acute, 3-5-nerved; upper glume .8-1.5 mm. long, helmet-shaped, elliptic-oblong, 3-nerved, glabrous or ciliate on the summit. *Lower floret*; lemma 1.8 mm. long, sub-elliptic, obtuse or somewhat acute, 3-nerved, lateral almost marginal, glabrous or ciliate at the apex; palea short. *Upper floret* hermaphrodite; lemma 1.8 mm. long, coriaceous, cartilaginous, whitish, cordate, semi-rounded, acute, mucronulate, sub-compressed, finely punctate, scarcely 3-nerved; palea 1.8 mm. long, 2-nerved, mucronulate. *Lodicules* quadrangular, shorter than the ovary.

A forest grass common all over the province up to 4,000 ft.

4. *Cyrtococcum accrescens* Stapf in Hook. Ic. Pl. sub tab. 3096 (1922). Syn. *Panicum accrescens* Trin. Sp. Gram. Ic. I (1828) t. 88.

Perennial. *Culms* tall, from a branching and decumbent base, often branching at the lower nodes, leafy to the top, nodes glabrous. *Leaf-blades* linear-lanceolate, ovate-lanceolate or lanceolate, contracted at the base, tapering to a sharp point, many nerved, smooth, margins scarcely thickened, smooth, with a few hairs at the base and on the margins a few tubercle-based hairs, 2.5 cm. to 10 cm. long, 4 mm. to 1.5 cm. broad; sheaths closely fitting, striate glabrous and smooth, or hairy, hairs from tubercle bases, margins usually ciliate; ligule a narrow membranous rim.

Inflorescence a very lax panicle, up to 25 cm. long, by 15 cm. broad; branches and branchlets capillary, straight or flexuous, absolutely smooth and glabrous. *Spikelets* 1.5 mm. long, pedicels of side spikelets up to 8 mm. long, slightly swollen and cup shaped at the tips. *Lower glume* ovate-acute, .75 mm. long, 3-nerved; upper glume deeply boat-shaped, 5-nerved; lower lemma ovate-oblong, 5-nerved, palea shorter than the lemma. *Upper lemma* 1.25 mm. long, yellowish or white, coriaceous, bellied, striate-punctate; palea of the same texture just shorter than the lemma.

Plains and hills up to 6,000 ft.

5. *Cyrtococcum radicans* Stapf in Hook. Ic. Pl. sub tab. 3096 (1922). Syn. *Panicum radicans* Retz. Obs. IV (1786) 18.

Perennial. *Culms* up to 45 cm. high, decumbent, creeping and branching below, sending up shoots, with long fibrous roots from the lower nodes; internodes longer than the leaf sheaths below; nodes and stem glabrous. *Leaf-blades* ovate to lanceolate, 2.5-7 cm. long, 5 mm.-1.5 mm. wide, gradually tapering to an acuminate tip, many nerved, nerves slender, both surfaces usually hairy with soft white hairs or practically glabrous, margins scarcely thickened, smooth; leaf sheaths striate, hispidly hairy with long hairs from tubercle-bases; margins long ciliate, throat hairy; ligule narrow, membranous, truncate.

Inflorescence a panicle, always contracted, branches few ascending, flexuous, smooth, spikelets gibbous, on rather short pedicels giving effect of a very close panicle; spikelets rarely exceeding 1.5 mm. long. *Lower glume* ovate-acute, .75 mm. long, 3-nerved; upper glume awned, keeled, 5-nerved. *Lower floret* barren; lemma ovate-acuminate, 5-nerved, 1.5 mm.: palea somewhat less than .75 mm. long; upper lemma much compressed, humped, yellowish or white, finely striate, punctate, 1.25 mm. long; palea of the same texture, narrow, slightly shorter than the lemma.

Hills and plains up to 6,000 ft.

6. *Cyrtococcum longipes* A. Camus in Bull. Mus. Nat. Hist. Paris, XXVII (1921) 118. Syn. *Panicum longipes* W. et A. in Wight, Cat. n. 1638.

Stems erect from a decumbent base, smooth and glabrous, .75-1 m. tall. *Leaves* 10-25 cm. long, .8-1.6 cm. broad, narrowed into a fine acuminate point, sparsely hairy at the base, finely puberulous beneath; sheaths nearly glabrous; ligule rounded.

Panicle 12.5-25 cm. long, fastigiately branched; branches simple below and naked for about 2.5 cm., then fastigiately branched; branches and long pedicels capillary; spikelets 2-2.25 mm. long glabrous, pale brown. *Lower glume* 2-2.5 mm. long, acuminate, 3-nerved; upper glume as long, acute; lower and upper lemmas with sparingly ciliate tips acute.

What may be a small form of the plant was collected at Golaghat, SIBSAGAR by C. B. Clarke.

11. ECHINOCHLOA Beauv.

Spikelets ovate to elliptic or lanceolate-oblong, usually cuspidate or awned, very convex on the back, flat or slightly depressed in front; falling entire from the pedicels, 2-nate or culstered, secund and abaxial on the triquetrous rachis of racemosely arranged, false spikes. *Lower floret* male or barren; upper floret hermaphrodite. *Glumes* unequal, membranous, the lower much shorter, more or less ovate from a clasping base, 3-5-nerved, acute, cuspidate or cuspidate, rarely produced into a short awn. *Lower floret* equalling the

upper glume (excluding cusps or awns); lemma very similar to the upper glume but flat and depressed on the back and often with a more pronounced cusp or awn; palea equalling the lemma in length or in barren florets more or less reduced, hyaline, finely 2-keeled. *Upper floret*; lemma ovate to elliptic-oblong, apiculate or obtuse, very convex on the back, subcoriaceous or crustaceous, polished, faintly 5-nerved, margins firm involute, not embracing tip of the palea; lemma and palea sub-equal and similar in substance, with rounded keels and flaps. *Lodicules* 2, cuneate, fleshy. *Stamens* 3. *Styles* distinct; stigmas plumose, exerted from near the tips. *Grain* broadly elliptic, dorsally flat, ventrally convex; hilum punctiform, sub-basal.

Perennial soft, tall or annual grasses; blades linear from a slightly constricted, or equally wide, rarely much attenuated base; ligule 0 or represented by a fringe of hairs; panicles of crowded or loosely arranged, secund, spiciform branches mostly bearing spikelets from the base or near it. *Spikelets* more or less hispid on the nerves of the glumes; and the lower lemma usually almost smooth.

Key to the species of *Echinochloa*.

Ligule a fringe of stiff hairs, at least in the lower leaves.

1. *E. stagnina*.

Ligule absent.

Spikelets 5-6 mm. long.

2. *E. frumentacea*.

Spikelets up to 4 mm. long.

Lower glume and upper lemma equally acute or cuspidate, racemes rather distant.

3. *E. colonum*.

Lower glume and upper lemma cuspidate or produced into an awn, the former less than the latter.

Spikelets 3-8 mm. long, generally in simple false spikes, cuspidate or more or less awned from the lower floret, sheaths slightly compressed; blades hardly decurrent.

4. *E. crus-galli*.

Spikelets 3-3.7 mm. long, very densely clustered in often compound false spikes, abruptly caudate-acuminate or rostrate or (from the lower floret) aristulate; margin of leaf base often decurrent, sheaths rounded.

5. *E. crus-pavonis*.

1. Echinochloa stagnina Beauv. Ess. Agrost. (1812)
161. Syn. *Panicum crus-galli* Linn. Sp. Pl. (1753) 56
(in part).

Perennial. *Culms* up to 2 m. from long creeping and copiously rooting rhizomes, geniculate at the base, rooting from the lower nodes, slender to stout, many noded, simple, smooth and glabrous. *Leaf-blades* linear from a slightly narrowed base, long tapering to a fine point, 15-45 cm. long, 6 mm.-2.5 cm. broad, flat, rigid, glabrous, green, rough; margins scabrid to spinulose; sheaths terete or keeled upwards, smooth and glabrous, usually ciliate near the mouth; ligule a fringe of rather stiff hairs, sometimes absent at the top.

Inflorescence a more or less nodding and secund panicle, 10-25 cm. long, made up of few to many branches, distant or rather crowded, alternate sub-erect, rhachis and branches hispidulous or scabrid, sometimes hirsute all over; pedicels usually 2-nate, tips discoid. *Spikelets* ovate, oblong to lanceolate-ovate, 5-7.5 mm. long; glumes thin, minutely, rigidly and appressedly pubescent between the hispidulous nerves, the cilia on the nerves often arising from tubercle bases; lower ovate to ovate-lanceolate, acute or acuminate, more or less mucronate, 3- to 5-nerved; upper corresponding in outline to the spikelet, concave, caudate acuminate or produced into a short, scabrid, compressed awn, 5-to 7-nerved at the tip, spinulose on the sides. *Lower floret* male or sometimes barren; lemma similar to the upper glume but flat or depressed on the back, sub-hyaline except at the herbaceous-membranous sides, produced into an awn 5 mm.-3 mm. long; palea oblong, with more or less scaberulous nerves. *Upper floret* hermaphrodite; oblong to lanceolate-oblong, mucronate-acuminate, 3.7-6.5 mm. long, straw coloured, polished; lemma and palea subcoriaceous, crustaceous. *Caryopsis* obovate-oblong, 3.1 mm. \times 1.6 mm., white. *Stamens* 3 in the upper and lower florets, 2 mm. long, translucent, dotted.

Very common in marshes in the plains.

Considered to be particularly rich grass for horses and cattle; the seed is edible and is collected in times of want. The submerged stems are rich in sugar and molasses is prepared from them in Africa.

2. Echinochloa frumentacea Link, Enum. Hort. Berol. (1827) 204.

Annual. Very robust, tufted, culms up to 1.5 m. tall, terete, smooth and glabrous, much branched from the swollen lower nodes; roots many, fibrous. *Leaves* linear lanceolate, acuminate, flaccid, up to 60 cm. long, 1-2 cm. broad, tapering gradually in the lower half to their insertions on the sheath, the junction being marked with a white ring, smooth and glabrous on both surfaces, scabrid on the margins; midrib white, prominent and sunk on the upper surface, appearing as a rounded keel on the lower surface; sheaths loose, membranous, longer than the internodes, slipping from the culms, smooth and glabrous, compressed and keeled in the upper half; ligule a glabrous, fleshy ring.

Inflorescence a panicle made up of alternate, 2-nate or 3-nate, closely spiculate, false spikes rather distant on a central axis. *Axis* angled, and scabrid on the angles, branched, villous at the insertion of the branches. *Branches* scabrid; branchlets 2-3 spiculate. *Spikelets* 5-6 mm. long, obovate-acute, cuspidate, turgid, plano-convex in outline. *Lower glume* 3 mm. long, clasping, broader than long, apiculate; 5-nerved, scabrid on the nerves, minutely hispid in the interspaces; upper glume shape of the spikelet, cuspidate, compressed, 5-6 mm. long, 5-nerved, often 7-nerved at the apex, scabrid on the nerves, minutely hispid in the interspaces. *Lower floret* empty; lemma shape of the spikelet, compressed cuspidate, 5-6 mm. long, 7-nerved, scabrid on the nerves, minutely hispid between the nerves; palea 3 mm. long, broadly ovate, obtuse, ciliolate on the margins with two infolded flaps. *Upper floret* hermaphrodite; elliptic acute, chartaceous, compressed at the tip which is minutely ciliolate; palea broadly elliptic acute, of the same texture, rounded on the margins, broadly infolded. *Lodicules* 2, cuneate, concave on top. *Anthers* 3, 1.5 mm. long. *Styles* 2, stigmas plumose.

A very robust grass with very large spikelets. Called *raishan* in Khasi. It is mixed with rice in the manufacture of rice beer. Is considered to be a very valuable fodder grass.

3. Echinochloa colonum *Link*, Hort. Berol (1827)
209.

An annual growing in small tufts up to 60 cm. high. *Culms* slender, erect or geniculately ascending, branched mostly in the lower part only, glabrous and smooth. *Leaf-blades* glabrous, rarely with some minute hairs on the blades, linear from a scarcely contracted base, tapering to a slender acute point, flat, flaccid, (sometimes with black cross bands) delicately pruinose, margins slightly rough; sheaths somewhat loose, more or less compressed, thin, smooth; ligule 0; junction of blade and sheath glabrous inside.

Inflorescence an erect panicle, 5-12.5 cm. long, very narrow; branches from 6 to many, solitary rarely 2-nate, erect and often appressed to the axis, or sometimes obliquely spreading, rather distant on the rhachis, lower 2.5-3.1 cm. long, upper decreasing gradually in length, forming dense simple, moderately stout sub-secund, sessile false spikes; pedicels 2-nate or fascicled lower down, very short, scaberulous, tips sub-discoid. *Spikelets* crowded, usually approximately 4-ranked, ovate to ovate-elliptic in outline, acute or cuspidate, 3.1-3.7 mm. long. *Lower glume* membranous, very broadly ovate and clasping at the base, acute to cuspidate 1.25 mm. long, scaberulous; upper glume sub-herbaceous, membranous, elliptic-ovate in outline, very concave, acute or cuspidate, 5-7-nerved, minutely pubescent between the scaberulous nerves. *Lower floret* male (always); lemma similar to the upper glume but flat or depressed on the back; palea oblong, acute, almost as long as the lemma; keels scaberulous upwards; upper floret hermaphrodite, elliptic-ovate or sub-ovate, cuspidulate, from less than 2.5 mm. to over 2.5 mm. long, yellowish or whitish, polished; lemma and palea subcoriaceous; anthers .9 mm. long. *Grain* broadly elliptic in outline. plano-convex, 1.9 mm. long.

A valuable fodder grass at all stages. Formerly cultivated in Egypt as a cereal. Not uncommon in the plains.

Seeds eaten in time of want.

4. **Echinochloa crus-galli** Beauv. Ess. Agrost. (1812)
161. Syn. *Panicum crus-galli* Linn Sp. Pl. (1753) 56.

Annual. *Culms* 30-1 m. high, geniculately ascending, slender to moderately stout, branched below, glabrous and smooth. *Leaf-blades* linear, from a scarcely narrowed base, tapering to an acute point 7.5-25 cm. long, 7.5-20 mm. wide, flat, sub-flaccid. smooth or scaberulous below, margins finely cartilaginous, scabrid to almost smooth; sheaths somewhat loose, the lower often compressed, all smooth, glabrous and striate except the basal which are pubescent above their insertion; ligule 0; junction of blade and sheath glabrous inside, marked by a brown zone.

Inflorescence an erect, stout or flexuous lobed panicle, 7.5-20 cm. long; axis triquetrous, scabrid, coarsely bristly; branches few to about 15, solitary or 2-nate, sub-erect or spreading, distant except the uppermost; pedicels fascicled or 2-nate, very short, scabrid, bristly at the base, tips subdiscoid. *Spikelets* crowded, ovate-elliptic in outline, acute, cuspidate or awned, 3.1-3.7 mm. long. *Lower glume* membranous, broadly ovate, clasping, obtuse to subcuspidate, 1.25 mm. long, 5-nerved, scaberulous; upper glume herbaceous membranous, very broadly ovate-oblong, concave, acute, cuspidate, as long as the spikelet, 5- or more-, the tip 7-nerved, rigidly pubescent between the scaberulous and spinulose nerves. *Lower floret* barren; lemmas similar to the upper glume, but flat and depressed on the back, cuspidate or produced into a scabrid, often long flexuous awn, 7-nerved (at least at the tip); palea elliptic, $\frac{3}{4}$ length of the lemma, keels scaberulous upwards. *Upper floret* hermaphrodite; elliptic-ovate in outline, cuspidate, over 2.5 mm. long, whitish or yellowish, polished; lemma and palea subcoriaceous; anthers oblong. *Caryopsis* broadly elliptic in outline, 1.8 mm. long.

There are apparently two forms: (a) A hairy narrow spikeletted form with a lanceolate lower glume more than half the length of the spikelet; usually awned; (b) the other with fat spikelets; lower glume sub-acute, less than half the length of the spikelet and the spikelets usually awnless or shortly awned.

Seeds eaten in time of want. A very common grass in paddy fields.

5. Echinochloa crus-pavonis (H. B. K.) Schult.
Mant. II (1824) 269.

An annual. *Culms* erect, stout, up to 1.75 m. tall, thick and spongy below, glabrous, smooth, sheathed all along; the nodes at length exserted. *Leaf-blades* linear to lanceolate-linear, base slightly narrowed, base often long decurrent in the upper leaves, tapering to a very long fine point, 12.5 to over 32 cm. long, 1.25-2.5 cm. long, flat, rather fine, glabrous, usually smooth; margins cartilaginous, scabrid to spinulose; sheaths terete, striate, smooth, quite glabrous or rarely slightly hirsute towards the junction with the blade, or ciliate upwards; ligule 0.

Inflorescence an erect panicle, linear-oblong to linear-lanceolate in outline, 10-30 cm. long, usually dense; axis triquetrous, scaberulous to very scabrid, branches solitary or frequently subopposite, mostly approximate and nearly always longer than internodes, obliquely erect, often very numerous, 1-2.5 cm. long, forming sessile stout compound false spikes, pedicels fascicled or very short and contracted; branchlets 2-nate, very stout, scabrid. *Spikelets* in compact clusters, ovate-elliptic or elliptic-oblong, abruptly caudate-acuminate or rostrate, about 3.1-3.7 mm. long. *Glumes* membranous rather thin, appressedly minutely and rigidly pubescent between the slender, spinulose nerves; lower very broadly ovate from a clasping base, acute to sub-acuminate, $\frac{1}{3}$ to almost half the length of the spikelet, 3- to 5-nerved; upper glume corresponding in shape and length to the outline of the spikelet, tips shortly mucronate or cuspidate, very concave, 5-nerved. *Lower floret* barren; lemma similar to the upper glume but flat or depressed on the back with cuspidate or aristate tips, awn slender, scaberulous; palea oblong, scaberulous above. *Upper floret* hermaphrodite, elliptic or ovate-oblong, sub-acuminate or cuspidate, up to 3.1 mm. long, greenish or greenish white, polished; palea and lemma sub-coriaceous to crustaceous; anthers .6 mm. long. *Caryopsis* broadly elliptic in outline, 1.5 mm. long.

Common in paddy fields.

12. OTTOCHLOA Dandy.

Spikelets narrowly elliptic to oblong or elliptic-oblong, acute or obtuse, awnless, dorsally compressed, abaxial, falling entire from the pedicels, arranged in short, or very short, racemes along the slender branches of contracted or open panicles. *Florets* 2; lower barren and reduced to the lemma; upper hermaphrodite, as long or nearly as long as the lower. *Glumes* similar, nearly equal, much shorter than the spikelet, membranous, lower lanceolate to ovate, 3-nerved, upper ovate to ovate-oblong, 3-7-nerved. *Lower floret*; lemma corresponding in outline to the spikelet, membranous, slightly depressed on the back, 7-9-nerved. *Upper floret*; lemma similar in outline to the spikelet, sub-coriaceous with narrowly hyaline, ciliolate margins, smooth or nearly so, obscurely 5-7-nerved; palea as long as the lemma and similar in texture, finely 2-nerved. *Lodicules* 2. *Stamens* 3. *Caryopsis* elliptic, dorsally compressed; scutellum nearly half the length of the caryopsis; hilum basal.

Perennial grasses; culms geniculate, often ascending from a procumbent base and rooting at the nodes; blades lanceolate-linear to lanceolate or linear, flat; ligules membranous; racemes more or less scattered.

Ottochloa nodosa Dandy, Jour. Bot. LXIX (1931) 54. Syn. *Panicum nodosum* Kunth, Enum. Pl. I (1835) 97.

A rambling perennial. *Culms* geniculately ascending from a creeping base, rooting at the lower nodes, up to 90 cm. high, slender, terete, finely striate, many-noded simple or branched at the base, usually glabrous and smooth. *Leaf-blades* lanceolate-linear to lanceolate, tapering to an acute tip, rounded or abruptly contracted at the base, 4-15 cm. long, 4-14 mm. wide, spreading, closely nerved and rough on the upper surface or smooth, glabrous or with scattered tubercle-based hairs. *Leaf-sheaths* much shorter than the internodes, loose, ciliate on the margins, otherwise glabrous, or loosely (rarely densely) hirsute with tubercle-based hairs; ligule truncate, about 0.5 mm. long.

Panicle loose, 8-25 cm. long; branches filiform, angular, scaberulous, solitary or the lower sometimes clustered, the

latter up to 15 cm. long; racemes up to 1.8 cm. long, few to 9-spiculate; pedicels very short. *Spikelets* oblong or narrowly elliptic-oblong, obtuse or acute, 2.8-3.5 mm. long, glabrous or rarely minutely hairy. *Lower glume* lanceolate, acute, 1.5-2.5 mm. long, 3-nerved; upper glume ovate to ovate-oblong, obtuse, 2-2.5 mm. long, 5-7-nerved. *Lower floret*; lemma elliptic-oblong and obtuse when flattened, 7-nerved. *Upper floret*; lemma elliptic-oblong, minutely granular. *Anthers* 1-2 mm. long.

Superficially this grass is similar to *Panicum auritum* Presl. but can easily be distinguished from it by the fact that the lower and upper glumes are sub-equal; in *P. auritum* the upper glume is nearly the length of the spikelet.

Common in both valleys and in the hills up to 3,000 ft.

13. PASPALUM Linn.

Spikelets orbicular to oblong, obtuse, rarely acute or acuminate, falling entire from the very short or obscure pedicels, secund and usually 2-nate on the flattened or triquetrous rhachis of false spikes, plano-convex; lower floret barren; reduced to the lemma, rarely with a rudimentary palea; upper floret hermaphrodite. *Lower glume* absent or minute; upper membranous, as long as the lemmas, rarely shorter or obsolete, usually with 1-2 submarginal side nerves on each side, with or without a middle nerve, rarely nerveless. *Lemmas* equal or sub-equal, lower resembling the upper glume usually 3- 5- (rarely 7-) nerved, with the side nerves curved, close, mostly submarginal and distant from the middle nerve when present; upper lemma chartaceous to sub-coriaceous, faintly 5-7-nerved; palea subequal to, and of the same texture as the lemma, 2-nerved. *Lodicules* 2, cuneate. *Stamens* 3. *Styles* distinct, slender; stigmas laterally exerted near the tip of the floret. *Caryopsis* tightly enclosed by the slightly hardened lemma and palea, dorsally sub-compressed; hilum basal, punctiform; embryo less than half the length of the grain.

Perennial or annual grasses; racemes 2-nate, digitate or paniced.

Key to the species of *Paspalum*.

- Spikelets small, up to 1·25 mm. .. 1. *P. compactum*.
 Spikelets larger, over 1·25 mm.
 Spikelets in 4 rows; rhachis wide; upper
 glume pubescent. .. 2. *P. longifolium*.
 Spikelets in 2 rows; rhachis narrow.
 Spikelets glabrous.
 Spikelets broadly elliptic or orbicular.
 Spikelets 2·5-3 mm.; annual; lower
 lemma 5-nerved. .. 3. *P. scrobiculatum*.
 Spikelets up to 2·5 mm.; perennial;
 lower lemma 3-nerved. .. 4. *P. orbiculare*.
 Spikelets elliptic-oblong, minutely pube-
 scent on upper glume; mid-nerve of lower
 lemma prominent, lower glume minute. .. 5. *P. distichum*.
 Spikelets ciliate.
 Spikelets small up to 2·5 mm., yellow-
 ish green.
 Spikelets 1·4-1·5 mm. long. .. 6. *P. conjugatum*.
 Spikelets 1·7-2·2 mm. long *P. conjugatum*
 var. *pubescens*.
 Spikelets 2·2-3 mm., purple. .. 7. *P. dilatatum*.

1. *Paspalum compactum* Roth, Nov. Pl. Sp. (1821)
 36.

Annual. *Culms* 15-25 cm. tall, ascending from a decum-
 bent base, rooting and branched at the lower nodes, often
 leafy to the top, deeply striate, very hairy at the nodes. *Leaf-*
blades ovate-lanceolate, acuminate, erect or spreading, base
 rounded and decurrent, many nerved, the nerves forming
 parallel ridges along the upper surface, flat, flaccid, very
 hairy on both surfaces, the hairs arising from small tubercle
 bases; margins scarcely thickened, ciliate along the margins
 with long white hairs; sheaths finally shorter than the inter-
 nodes, rather loose, very striate, nerves raised, white, in
 between the nerves are rows of white tubercles from which
 arise long white hairs; margins hirsute; ligule a rim of stiff
 white hairs.

Inflorescence a raceme of false spikes, solitary, or a
 very small false spike with one or two spikelets at the inser-
 tion of the longer spike, often subopposite; false spikes

decreasing in length upwards; lower about 2 cm. long; rhachis scarcely 1 mm. wide, convex, smooth on back and margins, a few white hairs in the axils and along the margins of the rhachis; axis triquetrous, deeply sulcate. *Spikelets* packed in 2 rows, seated upon short pedicels, 1 m. in length or a little longer, ovate-lanceolate, plano-convex in shape. *Lower glume* absent; upper glume as long as the spikelet, broadly ovate, convex, 5-nerved, the margins hyaline and folding round the upper floret; lower floret, sterile; lemma as long as the spikelet, flat; margins hyaline, scarious, ovate-obtuse in shape, 3-nerved; upper floret hermaphrodite; lemma broadly elliptic, scarcely apiculate, dull white or yellow, chartaceous, minutely punctate, palea of the same substance and texture and shape as the lemma. *Stamens* 3; anthers .5 mm. long.

Common in marshes in the hill districts.

2. *Paspalum longifolium* Roxb. Hort. Beng. (1810)

7.

A perennial grass with a well-developed rootstock. *Culms* .80-1 m. tall, numerous, erect or somewhat decumbent at the base, simple, rounded, slender at the top, glabrous. *Leaf-blades* 35-80 cm. long, 4-6 (rarely 10) mm. wide, erect, linear-acute, the lower carinate, the upper more or less flat, glabrous except at the base, margins scaberulous; sheath very long, rather lax, keeled and with some hairs near the top, otherwise glabrous; ligules short, scarious, with a few hairs.

Inflorescence a panicle made up of 6-24 false spikes often only 8-10, 5-8 cm. long, alternate, the lower more distant, often sinuous; rhachis almost as broad as the 4 rows of spikelets, glabrous on the back, margins flexuous, often purplish; pedicels glabrous or scaberulous, in rows, those of the outer row the longer, about $\frac{1}{2}$ the length of the spikelets. *Spikelets* 4-seriate, numerous; 1.5-2 mm. long, very imbricate, lenticular compressed, obovoid or oblong, mucronulate, green or violet, pubescent; lower glume absent; upper 1.5-2 mm. long, rather concave, membranous, obovate-oblong or oblong,

3-nerved; pubescence short. *Lower floret* barren; lemma equal and similar to the upper glume but flatter, 5-nerved; upper floret hermaphrodite; lemma 1.5-2 mm. obovate-oblong, slightly obtuse, coriaceous, shining, delicate, punctate, striate, very pale, with thick incurved margins embracing the palea; palea 1.5-2 mm. long, of the same shape and texture as the lemma with 2 large flaps at the base embracing the caryopsis. *Caryopsis* rounded, blackish.

Plains and hills up to 4,000 ft.

Var. lorirhachis Bor, varietas nova. *Rhachis* racemorum late, usque ad 8 mm. alata.

Specimens collected near Bhomraguri, DARRANG, are very robust with the rhachis very broad, up to 8 mm. across, with margins wrapped round the 4-seriate rows of spikelets. Typus in Herb. Dehra Dun, No. 78485, Bor.

3. *Paspalum scrobiculatum* Linn. Mant. I (1767) 29.

An annual grass. *Culms* erect or shortly decumbent at the base, 0.15-1.80 m., tufted, lower nodes often rooting, glabrous, very rarely hairy. *Leaves* almost if not quite erect, lanceolate or linear-lanceolate, acuminate, flat, base keeled compressed, scarcely contracted, more or less pubescent or glabrous, 15-40 cm. long by 2-8 mm. wide, margins scaberulous; ligule very short membranous.

Inflorescence a panicle consisting of 2 to several false spikes, distant, erect or spreading, 1.5-15 cm. long; the rhachis is flattened attaining 2 mm. in breadth rarely 3 mm., back striate margins scaberulous; pedicels equalling half the spikelet in length or even less. *Spikelets* secund, in 2 rows, 2-3.5 mm. long, imbricate, orbicular or sub-ovoid, plano-convex, glabrous; lower glume absent; upper 2-3.5 mm. long, concave, membranous, orbicular or sub-ovate, 5-7-nerved, glabrous. *Lower floret* neuter; lemma equal to and resembling the upper glume, almost flat, 5-7-nerved. *Upper floret* hermaphrodite; lemma 2-3.5 mm., orbicular or sub-ovate, thick, coriaceous, shining, scarcely punctate or striate, greenish or brown, margins involute; palea equalling the lemma in length and of the same texture, ovate or sub-orbicular, convex on the back, ventral surface with two large

flaps from below the middle embracing the caryopsis; lodicules quadrangular, emarginate. *Caryopsis* bi-convex, pale.

An annual. Doubtfully found in Assam.

4. *Paspalum orbiculare* Forst. Prodr. (1786) 7.

A perennial. *Culms* up to 75 cm. tall, from a slightly geniculate base, spongy below, terete above, smooth and glabrous, tufted, branched below. *Leaf-blades* sub-lanceolate-linear, up to 35 cm. long, 8-10 mm. wide, tapering to a very fine point, margins sometimes involute at the tip, smooth and glabrous on the surface, margins scarcely rough, or minutely scabrid or long ciliate (in one form, perhaps a variety, the surfaces are covered with spaced, long, white hairs) hardly contracted at the base; often a tuft of hairs on the collar at junction; sheaths rather loose, compressed below, scarious, persistent, smooth, glabrous, striate, or very hairy with white hairs, margin glabrous or ciliate.

Inflorescence consisting of a number of (2-5 or 6) false spikes, usually erect but often horizontal and drooping; racemes alternate, 3-7 cm. long; rhachis straight, convex, smooth and glabrous, 1-2 mm. wide, minutely striate on the margins; common axis flat, winged at the tip, smooth and glabrous except for a few hairs in the axils, pedicels stout, about $\frac{1}{3}$ the length of the spikelets. *Spikelets* many in 2 rows, overlapping, plano-convex, 1.8-2.2 mm. long, ovate-elliptic, broadly ovate or orbicular, smooth and glabrous. *Lower glume* absent; upper glume similar to the spikelet in shape, 5-nerved, very convex, glabrous. *Lower floret* sterile; lemma membranous, similar in shape and texture to the upper glume, flat, 3-nerved, this feature is not constant, however, and there may be one or two extra-marginal nerves and the side nerves may be double. *Upper floret* hermaphrodite; lemma sub-coriaceous to sub-crustaceous, yellow or brown in colour, punctate, polished, 1.5 mm. long, margins only slightly involute; palea of the same texture, shape and material as the lemma; at the middle on the ventral surface are two hyaline flaps which are folded over the stamens and ovary. *Stamens* 3, anthers .75 mm. long.

Very common up to 6,000 ft.

5. Paspalum distichum Linn. Syst. Nat. ed. 10, II (1759) 855.

A widely creeping perennial with sub-compressed culms and slender rhizomes, extensively stoloniferous, often forming loose mats, the stolons usually slender, sub-compressed, sometimes as much as 1 m. long; dark nodes often with a few ascending hairs. *Leaf-blades* flat, ascending, 3-12 cm. long, 2-6 mm. wide, wide at the rounded ciliate base, tapering to an acuminate, sometimes involute, apex dull green, relatively soft in texture, occasionally minutely pubescent on the upper surface; sheaths loose, keeled, commonly pilose on the margins towards the summit; ligule membranous about .3 mm. long.

Inflorescence of 2 racemes, rarely as many as four, from erect to reflexed, commonly incurved, 1.5-7 cm. long, rarely longer; rachis slightly pedunculate in one, sometimes in both racemes, with usually a few long white hairs in the axils, 1-1.5 mm. rarely 2 mm. wide, triquetrous, minutely scaberulous on the margin. *Spikelets* solitary, rarely in pairs in the middle of the racemes, imbricate, 2.5-3.5 mm. long (rarely 4), elliptic, abruptly acute, pale-green; lower glume occasionally developed. *Upper glume* and sterile lemma equal, 3-5-nerved, the mid-nerve relatively prominent, the glume minutely appressed, pubescent; caryopsis 2.5-2.8 mm. long, elliptic.

The grass is a useful soil-binder and a good fodder grass. Common in the plains.

6. Paspalum conjugatum Berg. in Act. Helvet. Phys. Math. VII (1762) 129. tab. 8.

Annual or perennial. *Culms* 20-60 cm. long, creeping and stoloniferous; stolons lengthy, strong, rooting at the nodes. *Culms* often erect, rounded or compressed, striate glabrous. *Leaf-blades* 5-20 cm. long by 6-12 mm. wide, linear-lanceolate, acute or acuminate, flat or compressed at the base, soft, covered with scattered hairs especially on the upper surface, margins densely ciliate, particularly at the base; sheaths very broad, lax, compressed, open to the base; striate, glabrous, ciliate on the margins, towards the summit

and on the throat, those of the upper leaves extended; ligules reduced to a pubescent ridge.

Inflorescence consists of 2 false spikes, rarely 3, 7.5-12 cm. long, very slender, erect, then spreading, very shortly pedicelled; rhachis narrower than the spikelet, straight or slightly flexuous, 3-nerved and convex on the back, strongly keeled, margins almost smooth; pedicels alternate, short, glabrous or pubescent, equal. *Spikelets* 2-seriate, deciduous, 1.4-1.5 mm. long, very imbricate, orbicular-ovate, apiculate, lenticular, compressed, pale greenish yellow or whitish, pubescent; lower glume absent; upper glume slightly convex, membranous, ovate-orbicular, slightly acute, marginal nerves long ciliate; hairs white, very thin, not wavy, or swollen at the top, .5-1 mm. long. *Lower floret* barren; lemma almost flat, nearly glabrous, similar in shape, length and texture to the upper glume. *Upper floret* hermaphrodite; lemma slightly convex, slightly coriaceous, broadly ovate, sub-apiculate, greenish-white, smooth, very glabrous, with margins narrowly incurved, 1.2-1.5 mm. long; palea similar to the lemma in texture and length, ovate oblong, margins thin, incurved, 2 flaps at the base; stamens short, oblong; filaments short. *Ovary* elliptic, glabrous; style short; stigmas light coloured.

This grass often invades plantations of forest species and is considered a pest. It is, however, a valuable fodder, appreciated by animals. Can be used as a lawn grass. Very common everywhere.

Var. pubescens Doell in Mart. Fl. Bras. II (1877) 55.

On the average coarser than the type, the blades commonly 15-20 cm., occasionally 25 cm. long, usually papillose-pubescent on both surfaces; racemes commonly 10-15 and at times 20 cm. long; spikelets 1.7-2.2 mm. long, rather more copiously ciliate than is usual in the species.

Plains of GOALPARA.

7. Paspalum dilatatum Poir. in Lamk. Encycl. V. (1804) 35.

A robust herb, .90-1.5 m. tall, with a thick rhizome. *Culms* erect, rigid, more or less flattened, often simple, glabrous, somewhat geniculate at the lower nodes, very leafy at

the base. *Leaves* erect, linear-lanceolate, long acuminate, flat, keeled at the base, glabrous, with long white hairs in the throat of the sheath, 30-60 cm. long, 5-15 mm. wide, margins cartilaginous, finely undulate, scaberulous; sheaths broad, compressed, open, striate, the lower with long white pubescence; ligule very short, membranous, lanceolate-acute.

Inflorescence of 4-5 (rarely 10-12) false spikes, distant, alternate, spreading, often drooping the upper slightly pedunculate, 5-10 cm. long, rhachis flattened, narrow, 1.5-2 mm. wide, sometimes flexuous, margins scaberulous. *Spikelets* 2-4-seriate, 3-3.5 mm. long, imbricate, broadly ovate-lanceolate plano-convex, long pubescent. *Lower glume* absent; upper glume 3-3.5 mm. long, concave, membranous, broadly ovate-lanceolate, acuminate, 5-nerved, glabrous on the back, very pubescent on the margins; hairs white, very slender, not swollen at the tips, not curled, .35-1.20 mm. long. *Lower floret* barren; lemma 2.7-3.2 mm. long, broadly ovate-lanceolate, acuminate, 7-nerved, pubescent. *Upper floret* hermaphrodite; lemma 1.6-2.5 mm. long, slightly convex, sub-cartilaginous, greenish, shining, scarcely punctate, striate, with margins slightly incurved; palea equalling the lower with the same texture, ovate-orbicular, back slightly convex, margins thin, recurved, with two flaps below the middle. *Stamens* linear; stigmas purple.

Introduced as a fodder grass and common in the hills.

14. PASPALIDIUM Stapf.

Spikelets ovate to ovate-oblong or ovate-lanceolate (in front view) awnless, convex to very convex on the back, flattened or slightly depressed on the face, turgid or dorsally moderately compressed, falling entire from the pedicels, solitary, secund, and abaxial on the triquetrous, sometimes herbaceously, marginate rhachis of slender sessile, spiciform racemes; lower floret male, with a usually well-developed palea or reduced to the lemma; upper floret hermaphrodite. *Glumes* mostly dissimilar and very unequal in length, the lower reduced to a small scale or up to (rarely over) half the length of the spikelet; upper mostly equalling the spikelet, 5-7-nerved with the nerves evenly distributed, rarely both

glumes much reduced. *Lower floret*; lemma similar to the upper glume with the inner side nerves more distant; palea if present only slightly shorter than the lemma with well-developed inflexed flaps. *Upper floret*; lemma oblong to elliptic in outline, acute to apiculate, emucronate, crustaceous, with firm involute margins, 5-nerved; palea almost as long as the lemma, 2-keeled, with its nodes slightly embraced by the lemma all along, of the same texture as the latter. *Lodicules* 2, small, broadly cuneate. *Stamens* 3. *Styles* distinct; stigmas plumose, laterally exerted from the top of the spikelet. *Caryopsis* more or less enclosed by the hardened lemma and palea.

Perennial, semi-aquatic or terrestrial grasses; blades linear, flat or involute, sometimes obtuse; ligules reduced to a ciliolate rim; racemes sessile or sub-sessile and secund on the alternate notches of a triquetrous common axis of a false compound spike, rigid, appressed or sub-appressed to the more or less hollowed out flanges of the latter; rhachis ending in a subulate point; spikelets mostly conspicuously 2-seriate and laterally contiguous, nearly always quite glabrous.

Key to the species of *Paspalidium*.

- | | |
|--------------------------------------|-----------------------------|
| Racemes longer than the internodes. | .. 1. <i>P. flavidum</i> . |
| Racemes shorter than the internodes. | .. 2. <i>P. punctatum</i> . |

1. *Paspalidium flavidum* A. Camus in Lecomte, Flor. Gen. de l' Indo-Chine VII. 419. Syn. *Panicum flavidum* Retz. Obs. IV (1786) 15.

Perennial (?). *Culms* 3.1-2 m. long, shortly decumbent at the base, then ascending, slender, somewhat compressed, glabrous. *Leaf-blades* 7.5-13 cm. long, by 3-7 mm. wide, ascending, somewhat rigid, linear-lanceolate, acute-acuminate at the summit, scarcely contracted at the base, flat or rolled, margins obscurely scabrous, glabrous, nerves obscure; sheaths longer than the internodes, compressed striate, glabrous or hairy on the throat, those of the lower leaves inflated; ligules absent or represented by a rim of hair.

Inflorescence a panicle of 6-9 false spikes, sessile, distant, erect or falciform, recurved, alternate, spikelets not very many; common axis triquetrous, glabrous, angles scaberulous; rhachis flattened, flexuous, with two rows of secund spikelets, closely imbricate, shortly produced beyond the last spikelet; pedicels very short. *Spikelets* 2-20, 1·8-3·5 mm. long, pale-greenish, ovate-oblong, somewhat acute, gibbous, glabrous; lower glume ·9-1·7 mm. long, convex, membranous, ovate, sub-orbicular or cordate, clasping, obscurely 3-nerved; upper glume 1·25-2·6 mm. long, convex, membranous, rounded-ovate, sub-orbicular, clasping, 7-nerved. *Lower floret* male or neuter; 1·8-3·5 mm. long; lemma convex, sub-coriaceous, ovate-oblong or ovate-lanceolate, 3-nerved, embracing the upper floret, nervation distinct; palea membranous, ovate-oblong. *Upper floret* hermaphrodite, 1·5-3·2 mm. long; lemma strongly convex, coriaceous, broadly ovate, sub-orbicular, mucronulate, while or brownish, delicately foveolate, embracing the palea; palea coriaceous, ovate-oblong, delicately foveolate, with recurved margins. *Lodicules* quadrangular, very short.

Common in marshes in the plains. The seed can be eaten in times of want.

2. *Paspalidium punctatum* A. Camus in Lecomte, Flor. Gén. de l' Indo-Chine VII, 419. Syn. *Panicum punctatum* Burm. Fl. Ind. (1768) 26.

Perennial. *Culms* ·6-1·2 m. long, floating and robust at the base, very spongy, rooting at the nodes, glabrous. *Leaf-blades* rigid or rather flaccid, linear-acute or acuminate, flat, narrow at the base, 10-30 cm. long, margins thickened, scabrid, nerves numerous, slender; sheaths long, lax, glabrous, those of the lower leaves inflated; ligule practically more or less reduced to a ring of hairs.

Inflorescence a panicle made up of distant, short false spikes, 15-22 in number, alternate, 1·5-4·5 cm. long, appressed to the rhachis. *Spikelets* numerous; common axis rather robust, furrowed; rhachis flattened, flexuous with scabrous margins, provided with two rows of secund spikelets and produced into a bristle beyond the uppermost spikelet. *Spike-*

lets 12-40, imbricate, pale, ovate-oblong, plano-convex, glabrous, 1.5-2.5 mm. long; lower glume .7-1.2 mm. long, membranous, truncate, clasping; upper glume, .7-1.2 mm. long; lemma almost flat, membranous, ovate-acute, 3-5-nerved; palea 0. *Upper floret* hermaphrodite, 1.5-2.5 mm. long; lemma strongly convex, coriaceous, ovate-lanceolate, acuminate, cuspidate, finely punctate, with margins slightly clasping the palea; palea flat, coriaceous, ovate-oblong, subcuspidate, finely punctate, with inturned margins. *Caryopsis* orbicular, compressed.

In marshes.

15. UROCHLOA. Beauv.

Spikelets broad ovate to elliptic or lanceolate-oblong awnless, usually more or less flattened or slightly depressed abaxially, convex on the back, falling entire from the pedicels, solitary or 2-nate, secund and abaxial on the more or less triquetrous, rarely strap-shaped, rhachis of moderately slender or somewhat stout, spiciform racemes; lower floret male or barren with a well-developed palea; upper floret hermaphrodite. *Glumes* similar and sub-equal or more often dissimilar or very unequal in length, the lower being the shorter, upper resembling, and more or less equalling, the lemma, with well-developed inflexed flaps and sharp, sometimes marginate, keels. *Upper floret*; lemma elliptic to rotundate-elliptic in outline, very obtuse with a usually scabrid or barbellate mucro, crustaceous with firm margins, narrowly involute, faintly 5-7-nerved; palea almost as long as the lemma, 2-keeled, tightly embraced by the lemma all along and of the same texture. *Lodicules* 2, broadly cuneate. *Stamens* 3, styles distinct; stigmas plumose laterally exserted. *Caryopsis* broadly to rotundate-elliptic, dorsally compressed, more or less flattened on both faces with broadly rounded sides; hilum sub-basal, punctiform. Perennials or annuals. blades linear to lanceolate, flat; ligules reduced to a ciliate rim; racemes sessile or sub-sessile on a common axis, simple or nearly so; rhachis more or less triquetrous, rarely strap-shaped; pedicels solitary or in pairs; spikelets close, continuous or slightly discontinuous, glabrous or hairy.

Urochloa panicoides Beauv. Ess. Agrost. 52 (1812) t. 11, fig. 1. Syn. *Panicum javanicum* Poir. Encycl. Supp. IV (1816) t. 274.

A tufted annual, 30-60 cm. high. *Culms* erect or geniculately ascending from a short, sometimes rooting base slender, sparingly branched below, nodes slightly pubescent or almost glabrous. *Leaf-blades* lanceolate to linear-lanceolate, from a wide and semi-amplexicaul base 4-15 cm. long by 0.8-2.4 cm. wide, soft, flat, pale or yellowish-green, finely hirsute with tubercle-based hairs, rarely almost glabrous, margins crisped and undulate and more or less ciliate; sheaths somewhat loose, striate, densely ciliate upwards, more or less hirsute with tubercle-based hairs; nodes pubescent to sub-villous; ligules reduced to a densely ciliate rim.

Inflorescence of 4-7 erect or spreading, stiff or slightly flexuous, sessile or sub-sessile, spiciform, secund racemes. *Common axis* flattened above, pubescent. *Racemes* moderately dense, 2-seriate, simple, 2.5-5 cm. long; rhachis flat or slightly wavy, triquetrous, flat on back, 1 mm. wide, villous at base glabrous upwards; angles scabrid, pedicels solitary, frequently bearing some long spreading hairs. *Spikelets* ovate- to elliptic- oblong, very acute, 4-5 mm. long, greenish, glabrous or pubescent. *Glumes* dissimilar; lower broad ovate, sub-obtuse to acute, clasping at the base, 1.5-2 mm. long; glabrous or sparingly and minutely pubescent, about 5-nerved, nerves anastomosing; upper glume corresponding in size and outline to the spikelet, prominently 8-11- (mostly 9-) nerved, glabrous or pubescent. *Lower floret* male or barren; lemma very similar to the upper glume but flat or slightly depressed, 5-7-nerved, glabrous and pubescent, very rarely with a lateral appressed fringe; palea oblong, acute, slightly shorter than the lemma. *Anthers* 2 mm. long. *Upper floret* hermaphrodite; rotundate-elliptic, greenish to pale-brown, 2.5-3 mm. long; lemma finely transversely rugose or granular, mucro up to 1 mm. long, sparingly barbellate. *Caryopsis* rotundate-elliptic in outline much compressed, 2 mm. long, yellowish or greenish.

Frequent on wet sand in the plains.

16. OPLISMENUS P. Beauv.

Spikelets oblong to ovate-oblong or lanceolate, awned from the glumes, falling entire from the pedicels, in small clusters on a common axis or 2-nate or solitary, secund and abaxial on the angular rhachis of racemosely arranged, densely or more rarely interruptedly, spiciform racemes; lower floret male or barren with a perfect or reduced or no palea; upper floret hermaphrodite. *Glumes* similar in shape and texture, sub-equal, herbaceous to membranous, 3-7-nerved, both, or at least the lower, awned, more or less keeled upwards. *Lower floret* exceeding the glumes; lemma resembling them, 5-9-nerved, muticous or mucronate or very shortly awned; palea sub-equal to the lemma and 2-nerved when perfect. *Upper floret*; lemma oblong, broadly involute with firm margins, muticous, chartaceous to sub-coriaceous; palea equalling the lemma and embraced by it all along. *Lodicules* 2, broadly cuneate, often delicate. *Stamens* 3. *Styles* distinct long; stigmas terminally or sub-terminally exerted, plumose. *Caryopsis* tightly enclosed by the somewhat hardened lemma and palea, oblong; hilum oblong $\frac{1}{3}$ - $\frac{1}{2}$ the length of the caryopsis.

Annual or more usually perennial often weak grasses with slender, many noded, ascending culms, the internodes of which have mostly a decurrent villous line adaxial to the subtending leaf; blades flat, thin, often slightly asymmetrical, often minutely cross veined; lower and intermediate racemes mostly distant; the awn of the lower glume the longest.

Key to the species of *Oplismenus*.

Spikelets in a false spike forming a panicle :—

Awns smooth, viscid, filiform. 1. *O. compositus*.

Awns barbellate, capillary; long. white hairs on the rhachis. 2. *O. burmannii*.

Spikelets fascicled on a simple terminal spike. 3. *O. undulatifolius*.

1. *Oplismenus compositus* P. Beauv. Ess. Agros. (1812) 54.

A perennial grass. *Culms* slender up to 1 m. long, ascending from a decumbent rooting base, terete, many noded, branched from the base, glabrous or frequently hairy along a

line adaxial to the supporting leaf. *Leaf-blades* lanceolate to linear-lanceolate from a constricted and distinctly rounded base, acuminate, 3·8-12·5 cm. long by 5 mm.-2 cm. wide, flat, thin, flaccid to rigid, dull green, minutely hairy to velvety below, sometimes with sparse white hairs above; sheaths markedly striate, densely ciliate along the margin, nodes usually pubescent, elsewhere glabrous; ligules short truncate, ciliate.

Inflorescence a panicle up to 18 cm. long, consisting of a series of secund or subsecund, spiciform racemes mostly distinct on a triquetrous rhachis varying from glabrous to hairy all over. *Racemes* decreasing in length upwards, the lowest 2·5-5 cm. long; rhachis flexuous, triquetrous, terminated by a spikelet, glabrous or sparingly hairy, bearded at the base; pedicels 2-nate or solitary, very short and stout, tip truncate, with a few bristles. *Spikelets* lanceolate to lanceolate-oblong, acuminate, 3·8-5 mm. long (excluding the awns) green to greenish, often with purple tips or tinged with red. *Glumes* sub-equal, 3·1 mm. long, thinly herbaceous-lanceolate to lanceolate-oblong in profile, produced into slender filiform, more or less viscous, purple awns, sparingly hairy, rarely quite glabrous; lower glumes 5-nerved, awn up to 12·5 mm. long; upper glume 7-9-nerved, awn 2·5-3 mm. long; if the spikelets are paired, only the lower glume has an awn. *Lower floret* barren equalling the spikelet; lemma similar to the upper glume apiculate, mucronate or with a very short awn, 9-nerved; palea very much reduced or 0. *Upper floret* hermaphrodite; oblong, acute 3·1 mm. long, whitish to brownish, polished; palea and lemma sub-coriaceous. *Caryopsis* dorsally compressed.

Very common in sal and other forests up to 6,000 ft.

2. *Oplismenus burmannii* P. Beauv. Ess. Agros. (1812) 54.

Annual. *Culms* very slender. up to .5 m. high, ascending from a long decumbent and rambling, rooting base, simple or more often branched upwards, branches short or barren or flowering, glabrous or hairy along a line adaxial to the supporting leaf. *Leaf-blades* lanceolate from a con-

stricted and slightly rounded base, acutely acuminate, 2.5 cm. long, 5 mm.-1.3 cm. wide, flat, thin and soft, loosely, but very sparingly, covered with long, white hairs, smooth, margins slightly scaberulous upwards; sheaths somewhat loose, prominently striate, ciliate along the margins and pubescent at the nodes, otherwise glabrous or more or less hairy; ligules very short, truncate.

Inflorescence a panicle consisting of 3-8, more or less secund, very dense, pale, spikelike racemes on a slender, triquetrous, glabrous or finely pubescent axis; lower racemes rather distant, erect or oblique, linear, the longest rarely over 1.6 cm. long; rhachis usually terminated by a spikelet, dorsally flat, fringed with silky hairs; pedicels 2-nate or solitary, short truncate. *Spikelets* contiguous, oblong, lanceolate, about 2.5 mm. long, one of a pair often imperfect. *Glumes* sub-equal, (upper slightly longer), 1.8-2 mm. long, thinly membranous to sub-hyaline, oblong in profile with capillary, slightly rough awns 2.5-10 mm. long, from a minute notch, ciliate and more or less pubescent; lower glume 3-nerved; upper 5-7-nerved. *Lower floret* barren; lemma lanceolate-oblong in profile, acuminate, produced into a very fine, short, capillary awn, 7-nerved, ciliate upwards and finely pubescent above the middle; palea 0. *Upper floret* hermaphrodite, oblong-acute, 2.5 mm. long, brownish, polished; lemma and palea papery, the former faintly 7-nerved. *Anthers* 1.25 mm. long. *Stigmas* moderately long, red. *Caryopsis* lanceolate-oblong, 2.5 mm. long, convex on the back, almost flat on the face, with a narrow oblong hilum almost half the length of the caryopsis.

A common grass of waste places in the plains.

3. *Oplismenus undulatifolius* P. Beauv. Ess. Agros. (1812) 54.

Perennial. *Culms* up to 60 cm. tall, ascending from a long, rambling base, often rooting at the nodes, simple or branched below, prominently striate or sulcate, internodes longer than the sheaths, glabrous or hairy along a line adaxial to the leaf concerned; nodes hairy. *Leaf-blades* linear-lanceolate to ovate-lanceolate, base tapering to

its insertion on the sheath, rounded, tapering to a point, surface often covered with long soft hairs or glabrous, smooth or rough, margin scarcely thickened, scabrid; leaf-sheaths rather loose, striate, finally shorter than the internodes, glabrous or with long soft, white hairs from tubercle bases, densely ciliate along the margins, 6-15 cm. long, 1-1.5 cm. wide.

Inflorescence a spike consisting of a central axis upon which are spaced small fascicles of spikelets. *Axis* triquetrous subacute, angles hirsute especially towards the top. *Spikelets* in clusters of from 1-6, sessile, of which several may be imperfect or seated upon very short, hairy pedicels. Perfect spikelets lanceolate, 3-5 mm. long, awned, more or less hairy and rough. *Lower glume* ovate-obtuse, 5-nerved, 2 mm. long, long awned from below the tip; awn up to 1.8 cm. long; upper glume little longer than the lower, short awned; lower floret barren, minutely paleate or epaleate; lemma equalling the spikelet in length, ovate-acute in shape, 7-9-nerved, hairy along the nerves, scabrid in between; the margins clasping the upper floret; upper floret hermaphrodite; lemma elliptic-mucronate, 3 mm. long, margins flat, clasping the palea, smooth, shining, white, sub-coriaceous, translucent; palea of the same substance as the lemma and as long, margins infolded. *Stigmas* 2, long exserted.

Hardly more than a state of *O. compositus* Beauv. Rather uncommon. Found in the hill forests 2-4,000 ft.

17. PSEUDECHINOLAENA Stapf.

Spikelets obliquely ovoid, laterally compressed and mostly conspicuously gaping, falling entire from the pedicels, 2-nate or more often sub-solitary (the second of the pair more or less arrested) or solitary, secund on the flat or triquetrous slender rhachis of spiciform, racemosely arranged racemes; lower floret male or barren; upper floret shorter than the lower, hermaphrodite. *Glumes* herbaceous, about equal, long or almost as long as the spikelet, or the lower distinctly shorter, heteromorphous; lower more or less flat, 3-nerved, always smooth or nearly so, upper boat-shaped, gibbous downwards, 7-nerved, with longitudinal rows of more or less transparent "glands" between the nerves and with

or without, shorter or longer, stout hooked hairs or bristles from the centre of the spots. *Lower floret* as long as the spikelet; lemma oblong-lanceolate with a minutely truncate tip, laterally compressed but rounded on the back, chartaceous with membranous margins and a delicate hyaline area at the base, smooth; palea almost as long as the lemma, more or less convolute, faintly 2-nerved. *Upper floret*; broad lanceolate to oblong, sub-acute, very convex on the back, chartaceous, faintly 5-nerved; palea similar to the lemma in texture, tightly clasped by it when mature. *Lodicules* 2, cuneate. *Stamens* 3. *Styles* free at the base, capillary; stigmas plumose, sub-terminally exerted. *Caryopsis* oblong in face-view, semi-obovate in profile, back very convex, scutellum elliptic, almost half the length of the grain; hilum sub-basal; punctiform.

Perennials with very slender culms from a prostrate rooting base; leaf-blades lanceolate, soft; spikelets very irregularly armed or quite unarmed.

Pseudechinolaena polystachya Stapf, in Flor. Trop. Afric. IX. 495. Syn. *Panicum uncinatum* Raddi, Agrost. Bras. (1823) 41.

Perennial. *Culms* rooting and branching at the base, finally ascending, slender, pubescent at the nodes. *Leaf-blades* thin, flat, spreading, ovate-lanceolate, acuminate, nerved at the base, oblique, with scattered hairs on the surfaces and tubercled-based hairs at the base, 5-10 cm. long, nerves faint; margins scarcely scabrid; sheaths pubescent with ciliate margins; ligules short, membranous-scarious, truncate.

Inflorescence a narrow panicle 4-20 cm. long; rhachis slender, smooth; branches 2-6, separate, erect, filiform, flexuous, spiciform, scaberulous, the lower 2-3 cm. long the upper shorter; pedicels very short, scabrid. *Spikelets* 4-5 mm. long, erect, dimidiate-ovate, compressed laterally, 1-2-nate, with a glume like branch at the base of the pedicel, often reduced on the lower branches of the panicle to lanceolate or subulate glumes; lower glume 4.2-4.5 mm. long, oblong-lanceolate, acuminate, keeled, 3-nerved, glabrous or with silky hairs towards the summit, often scabrid; upper glume 4.5 mm.

long, herbaceous, with broadly membranous margins, gibbous, ovoid, cymbiform, acute or acuminate, obscurely 7-nerved, reddish, glandular, often hispid, with hooked hairs. *Lower floret* male; lemma 4.3-4.5 mm. long, coriaceous, margins thin, broadly ovate obtuse, 7-nerved, palea 4.3-4.5 mm. coriaceous, lanceolate, finely acuminate, margins involute. *Upper floret* hermaphrodite, sessile; lemma 3.5-3.7 mm. long, cymbiform, oblong-lanceolate, acute or acuminate, shining, smooth, white, coriaceous, compressed laterally, rounded on the back, margins strongly incurved; palea narrow, of the same texture as the lemma.

Common all over the province. It is essentially a forest grass.

18. ERIOCHLOA H. B. K.

Spikelets ovate-lanceolate to oblong, acute or acuminate, sometimes finely shortly aristulate, slightly compressed from the back, falling entire from the pedicels, 2-nate or solitary, secund and adaxial on the triquetrous rhachis of more or less spiciform, simple or compound, racemosely arranged racemes; lower floret male or barren; upper floret hermaphrodite. *Glumes* very unequal, the lower reduced to a minute cupular rim clasping the thickened, beadlike, lowest internode of the spikelet; upper corresponding in outline and size to the spikelet, sometimes shortly aristulate, membranous faintly 5-nerved, the sub-marginal nerves sometimes obscure. *Lower floret*; lemma very like the upper glume, if not slightly shorter; palea sub-equal to the lemma, 2-keeled or reduced, or suppressed. *Upper floret*; lemma chartaceous to almost crustaceous, glabrous or very minutely puberulous at the apex, faintly 5-nerved, with a fine, barbellate mucro of varying length; palea equal to the lemma, 2-keeled, with narrow flaps. *Lodicules* 2, broadly cuneate. *Stamens* 3. *Styles* distinct, stigmas laterally exerted near the tips of the spikelets. *Caryopsis* enclosed in its floret and the tightly appressed lower floret and upper glume, dorsally compressed; hilum sub-basal, punctiform.

Perennials or annuals. *Leaf-blades* more or less flat, ligules reduced to a ciliate rim. *Racemes* peduncled or the upper sub-sessile, racemosely arranged in a narrow panicle.

Eriochloa procera C. E. Hubbard in Kew Bull. 1930. 256. Syn. *E. polystachya* H. B. & K. Nov. Gen. et Sp. I (1815) 95.

A perennial grass with fasciculate fibrous roots and a short creeping rhizome. *Culms* 3-1.5 m. tall, densely tufted, simple or branched, erect or decumbent at the base. often geniculate, glabrous, swollen and pubescent at the nodes, striate. *Leaf-blades* erect, linear or linear lanceolate, acuminate, flat, soft, striate, glabrous, 9.5-25 cm. long, smooth or with scarcely scabrid margins; sheaths open, compressed, sub-carinate, glabrous or not, striate, the upper the longer; ligule very short, hairy.

Inflorescence a panicle made up of simple or branched spikes, erect or not, 5-13 cm. long, in a simple panicle, or very short in a branched panicle; rhachis slender, angular, quite smooth; branches often bare at the base; pedicels solitary or 2-nate, the longer shorter than the spikelet, triquetrous, swollen at the apex and carrying silky hairs. *Spikelets* very laxly imbricate, erect, 2.5-3.5 mm. long, ovate-lanceolate, acuminate compressed, velvety, with hairs at the summit, which are rigid, erect, not capitate, .3-.4 mm. long. *Lower glume* absent; upper glume 2.5-3.5 mm. long, membranous, convex, ovate-lanceolate, acuminate, with the margins somewhat inrolled, 3-5-nerved, silky. *Lower floret* sterile; lemma 2.3-3.2 mm. long, flatter, otherwise similar to the upper glume; palea absent. *Upper floret* hermaphrodite; lemma 1.5-1.8 mm. long, subcoriaceous, pale, shining, compressed dorsally, oblong-obtuse, sub-convex, margins narrowly inflexed and embracing the palea, with a few hairs at the top, continued into a mucro with short rigid erect hairs; palea a little shorter than the lemma; oblong, obtuse, almost flat with inflexed margins. *Caryopsis* free within the hardened lemma and palea, pointed at the base, obtuse above, compressed lenticular, smooth.

Common in marshes in the plains.

19. AXONOPUS Beauv.

Spikelets elliptic-oblong to oblong or lanceolate, depressedly biconvex, falling entire from the rudimentary pedicels,

solitary, secund and adaxial on the triquetrous, or more or less flattened rhachis of very slender spikes or spike-like racemes; lower floret barren, reduced to the lemma; upper floret hermaphrodite. *Glumes*; the lower suppressed, the upper equal to the spikelet, membranous, very finely or faintly 5-4-nerved. *Lower floret*; lemma very similar to the upper glume, with the nerves still finer and the middle nerve often absent. *Upper floret*; lemma chartaceous, to crustaceous, with firm margins, obtuse, emucronate, faintly 4-nerved; palea equal or sub-equal to the lemma and similar in substance, tightly embraced by the narrowly involute margins of the lemma. *Lodicules* 2, minute, broadly cuneate. *Stamens* 3. *Styles* distinct; stigmas laterally exerted near the tip of the floret. *Grain* tightly enclosed by the slightly hardened lemma and palea, elliptic, dorsally much compressed, flat on both sides; hilum sub-basal, punctiform; embryo less than half the length of the grain :

Stoloniferous or caespitose perennials; blades more or less linear, flat or folded or involute; ligules very narrow, membranous; spikes 2 or more, often very many, digitate or sub-digitate, if many then usually crowded on a short common axis, sessile, simple, spikelets usually small to very small, and closely appressed to the rhachis which is sometimes chambered by the rudimentary pedicels and then widened insertions from cross bars running from the facial angle to the margin.

Axonopus compressus (Sw.) Beauv. Ess. Agros. (1812) 154.

A perennial grass. *Culms* often erect but more usually ascending from a geniculate base, tufted, slender, glabrous, smooth, seated on a slender rhizome; stolons creeping and rooting. *Leaf-blades* linear-lanceolate to linear from a more or less rounded base, obtuse or shortly acute, 5-12 cm. long, 5-15 mm. wide, folded or flat, bright green, quite glabrous or rigidly ciliate, rarely loosely hairy all over, midrib and primary laterals very slender, but quite distinct below; leaf-sheaths compressed and keeled, crowded and flabellate, gla-

brous or sparingly hairy, striate and smooth; ligules a narrow membranous rim, minutely ciliate.

Inflorescence of 2-3-5 sub-digitate, sessile, erect or spreading racemes; common axis very slender angular glabrous, if three or more spikes, the lowest internode often over 2.5 cm. long. *Spikes* very slender 5-7.5 cm. long; rhachis straight or flexuous if long, about .75 mm. wide, triquetrous, angled and narrowly winged, angles scaberulous or almost smooth; pedicels alternately to left and right of the frontal angle, reduced to smooth elliptic sub-sessile discs. *Spikelets* oblong to lanceolate-oblong, sub-acute to acute, 2-2.5 mm. long (in Assam specimens). *Lower glume* absent; the upper the shape of the spikelet with narrowly incurved margins, membranous on the back, papery on the margins, 4-5-nerved, bearing 4 lines of very fine hairs, sometimes hairs scanty or inner lines absent. *Upper floret* hermaphrodite, much shorter than the spikelet, elliptic-oblong, obtuse, white; lemma and palea thinly crustaceous, the former very faintly 4-nerved, finely and shortly hairy at the top. *Grain* elliptic in outline, obtuse, white; scutellum rotundate elliptic, not reaching the middle of the grain.

This species is quite common in LAKHIMPUR District, especially about Tinsukia in Dibrugarh. It is considered an excellent pasture grass and forms a mat when regularly grazed. Known as "Carpet Grass." It prefers low lying, clayey, water logged conditions.

20. BRACHIARIA Griseb.

Spikelets oblong to ovate, broadly elliptic, obovate-elliptic or elliptic-oblong, awnless, usually more or less flattened and slightly depressed, convex on the back, falling entire from the pedicels, 1-2-nate, more rarely in fascicles of 3 or more, secund and adaxial on the triquetrous or flat rhachis of moderately slender or stout, mostly spiciform racemes. *Glumes* dissimilar and mostly very unequal in length, the lower being the shorter, upper resembling and more or less equalling the lemma of the lower floret, 5-7-(very rarely 9-) nerved with the nerves evenly distributed. *Lower floret* male or barren with a usually well-developed palea, very rarely the latter suppressed; lemma 5-, very rarely 7-nerved, lateral nerves near margin; palea usually only slight-

ly shorter than the lemma with well-developed inflexed flaps. *Upper floret* hermaphrodite; lemma oblong to elliptic in outline, emucronate, though sometimes contracting into a small projecting point, more or less crustaceous or subcoriaceous with firm margins, narrowly involute, faintly 5-nerved; palea almost as long as the lemma, 2-keeled, its side lightly embraced by the lemma all along and of the same texture. *Lodicules* 2, small broadly cuneate, stamens 3, styles distinct, stigmas plumose, laterally exerted from the top of the spikelet. *Caryopsis* tightly enclosed by the hardened lemma and palea.

Perennial or annual. *Leaf-blades* linear to lanceolate, usually flat; ligules reduced to a narrow ciliate or ciliolate rim; racemes usually sub-sessile and solitary on a common axis, simple or compound near the base; rhachis filiform, triquetrous to more or less flattened; pedicels solitary or in pairs; spikelets usually closely appressed.

Key to the species of *Brachiaria*.

Spikelets densely crowded, in more than 2 rows, 2.5-3 mm. long, sheath nodes usually long bearded, culms stout, rhachis flattened. ..

1. *B. mutica*.

Spikelets loose or if crowded less than 2.5 mm. sheath-nodes glabrous or pubescent; culms slender.

Lower glume at least $\frac{2}{3}$ length of spikelet. 2.

B. paspaloides.

Lower glume up to $\frac{1}{3}$ length of the spikelet.

Spikelets 1.8-2.5 mm. long; rhachis triquetrous.

Panicle linear with erect racemes, rhachis pubescent.

3. *B. eruciformis*.

Panicle lanceolate to oblong with spreading racemes; rhachis with scattered hairs.

Spikelets solitary 1.8-2.5 mm., often densely hairy as well as rhachis and pedicels, upper lemma ovate-oblong.

4. *B. villosa*.

Spikelets paired or upwards solitary, 1.25-1.8 mm. long; hairs on the spikelets longer than spikelet, upper lemma obovate or elliptic.

5. *B. reptans*.

Spikelets 2.5-4 mm. long, rhachis triquetrous or flattened.

Spikelets turgid, broadly elliptic or broadly obovate-elliptic, apiculate. ..

6. *B. ramosa*.

Spikelets not turgid.

Spikelets ovate to lanceolate, paired in the lower part of the racemes; rhachis hairy.

7. *B. setigera*.

Spikelets elliptic to obovate, rhachis glabrous.

Spikelets elliptic, widest at or just below middle, sharply acute, rhachis glabrous.

Spikelets 3·5-4 mm. long. .. 8. *B. subquadrifera*.

Spikelets 2·5 mm. long. .. 9. *B. kurzii*.

Spikelets obovate or obovate-elliptic, obtuse or shortly acute.

Spikelets 3·5-4 mm. long, racemes 3 or more, peduncle glabrous, rarely puberulous, leaves 1·5-6·5 cm. long. .. 10. *B. miliiformis*.

Spikelets 2·5-3 mm. long, racemes 2-3(4); peduncle below inflorescence hairy; leaves 7·5-16 cm. long. .. 11. *B. distachya*.

The following three species are very closely related and difficult of discrimination. Their characteristics are set out in more expanded form to aid identification.

Brachiaria distachya (L) A. Camus.

Spikelets 2·5-2·8 mm., obovate-ovoid, gradually narrowed below, greatest width distinctly above the middle, rather abruptly acuminate, apiculate; lower glume 1 mm. long. Racemes often 2, subconjugate.

Brachiaria subquadrifera (Trin.) Hitch.

Spikelets 3·5-4 mm., lanceolate-oblong, greatest width just at the middle, not abruptly acuminate, nor apiculate, acute only; lower glume 2 mm. long. Racemes 3-4 or more never conjugate.

Brachiaria miliiformis Chase.

Spikelets obovate, elliptic-obovate or oblong-obovate, plump, with a shortly acute or apiculate or somewhat obtuse apex.

1. *Brachiaria mutica* Stapf, in Flor. Trop. Afr. IX (1934) 526. Syn. *Panicum muticum* Forsk. Flor. Aegypt. Arab. (1775) 20.

Perennial with well-developed root. Culms 0·6-2·4 m. rooting, branchy, robust, geniculate at the base, then ascending, slender and bare at the top, compressed, striate, glabrous; nodes covered with long white hairs; leaves spreading, linear

or linear-lanceolate, acuminate, sub-cordate at the base, flat, glabrous or slightly hairy on the under-surface, scaberulous, 15-25 cm. long, 1·25-1·6 cm. wide, margins hispid; sheaths compressed, striate, lax, glabrous or hairy at the throat; ligules short, very hairy.

Inflorescence a panicle made up of 8-20 false spikes or racemes, simple or compound at the base, erect or somewhat spreading, alternate, distant, robust, lower 5-10 cm., the upper shorter; principal axis almost rounded, angular at the summit, almost straight, striate, glabrous; rhachis of the racemes striate, back convex, ciliate on the margins and with a few long hairs at the base. *Pedicels* short, paired, solitary or fascicled with numerous spreading hairs. *Spikelets* green or violet, crowded, ovate-acute, 2·5-3 mm.; glabrous, lower glume 1·6-1 mm., membranous, concave, ovate-acute, 1-nerved, upper glume 2·5-3 mm., membranous, concave, ovate-acute, 5-nerved. *Lower floret* male or occasionally neuter; lemma 2·4-2·7 mm. long, almost the same as the upper glume but flatter and not so definitely nerved; palea 2·2-2·7 mm. long, narrower than the lemma, hyaline, 1-nerved. *Stamens* shorter than the lemma, filaments very short, anthers purple. *Upper floret* hermaphrodite, 2-2·5 mm. long, sub-sessile; lemma pale, convex, depressed on the back, sub-coriaceous, oblong or elliptic, obtuse, pitted; mucro almost absent; margins hardly incurved; palea sub-coriaceous, back flat, pitted elliptic, obtuse, margins inturned.

Grown as a valuable fodder grass in many parts of the tropics and has been introduced into ASSAM.

2. *Brachiaria paspaloides* (Presl) C. E. Hubbard. Hook. Ic. Pl. sub tab. 3363. Syn. *Urochloa paspaloides* Presl, Rel. Haenk. I (1830) 318; *Panicum ambiguum* Trin. in Mem. Acad. St. Petersb. ser. 6. Sci. nat. III (1835) 243.

Annual. *Culms* 15-75 cm., branchy, rooting at the base, slender, pubescent at the summit and at the nodes, internodes long. *Leaf-blades* linear, acuminate, contracted and rounded at the base, narrow, flat, more or less hairy on both surfaces, 7·5-15 cm. long by 4-5 mm. wide, smooth above, scaberulous below and on the margins; median nerves slender; sheaths

open, narrow, glabrous or hairy; margins ciliate below the middle; ligule a tuft of hairs.

Inflorescence a panicle made up of 3-4, rarely 6-7 false spikes, sub-erect, sub-sessile, slender, 2.5-6 cm. long; principal axis of the panicle triquetrous, scaberulous, glabrous or with a few hairs at the nodes; rhachis of racemes round, with ciliate margins; pedicels pubescent. *Spikelets* greenish, sub-erect, laxly biseriate, imbricate, oblong-ovate, acuminate, compressed, glabrous, 3.4-5 mm. long. *Lower glume* 3.4-2 mm. long, almost flat, clasping, membranous, ovate-acute, with five green nerves; upper glume 3.4-5 mm. long, convex, membranous, ovate-lanceolate, acuminate, 7-nerved. *Lower floret* male or neuter; lemma 2.3-5 mm. long, almost flat, membranous, ovate-lanceolate, acuminate; palea very short or 0, membranous. *Upper floret* hermaphrodite, slightly stipitate, 2.3-5 mm. long; lemma convex, slightly flattened dorsally, sub-coriaceous, elliptic-oblong, summit obtuse, aristulate, sometimes delicately pitted, obscurely 5-nerved, margins embracing the palea; crest hidden by the lower lemma and the upper glume, scaberulous, palea subcoriaceous, or sub-elliptic, delicately pitted, with the margins strongly infolded.

GOALPARA, rare.

3. *Brachiaria eruciformis* Griseb. in Ledeb. Fl. Ross. IV (1833) 469. Syn. *Panicum isachne* Roth, Nov. Pl. Sp. (1821) 54.

Annual. *Culms* 30-60 cm. high, loosely tufted, geniculately ascending from a sometimes decumbent and rooting base, slender, much branched below, terete or slender, glabrous. *Leaf-blades* linear-lanceolate, base rounded, acute, 2-6 cm. long by 2-5 mm. wide, flat or convolute, rigid, glabrous or hairy, margins very scabrid; sheaths rather tight, terete or sub-terete, striate, softly hairy or glabrous except at the villous nodes; ligules reduced to a dense fringe of hairs.

Inflorescence of secund or sub-sekund, very narrow racemes, 2-10 in number, usually appressed to the filiform, scabrid axis, which is terete below and flattened upwards; racemes simple, dense, 1.25-2.5 cm. long; rhachis

filiform, triquetrous, straight or slightly wavy, scabrid or ciliate; pedicels solitary, very short, scabrid, tips thickened. *Spikelets* 2-seriate, imbricate, oblong, obtuse or subacute, flat on the back, 2.2-5 mm. long, softly pubescent. *Glumes* very unequal; lower a truncate, hyaline scale .3 mm. long, rarely .5 mm. long, 1-nerved; upper membranous, corresponding in outline and size to the spikelet, 5-nerved, minutely hairy. *Lower floret* neuter or rarely male; lemma, very similar to the upper glume, faintly 5-nerved; palea very obtuse, subequal to the lemma in male, reduced in neuter florets. *Upper floret* hermaphrodite, elliptic-oblong, obtuse, 1.5-1.6 mm. long; lemma and palea thinly crustaceous, shining, whitish or at length brownish, finely granulate, *Anthers* 1 mm. long. *Caryopsis* oblong, elliptic or obovate-oblong, 1.1-5 mm. long, more or less flattened on both sides, mainly on the back, olive green.

In marshes in the plains.

4. *Brachiaria villosa* A. Camus in Lecomte, Flor. Gen. de l' Indo-Chine, VII 433. Syn. *Panicum villosum* Lamk. Illus. I (1791) 173.

Annual. *Culms* 20-40 cm. high, rooting at the base, somewhat slender, softly hairy, glabrous at the top, with numerous nodes, velvety. *Leaves* spreading, ovate or ovate-lanceolate, acute at the summit, rounded at the base, flat, thin, 1.4 cm. long, softly pubescent on the 2 surfaces; margins white, denticulate, ciliate; nerves well-marked; sheaths shorter than the internodes, hairy; ligule a ring of hairs.

Inflorescence a panicle made up of 5-10 racemes, upright or somewhat spreading, alternate, sessile or sub-sessile, rather distant, 6-15 mm. long, the upper shorter; axis triquetrous, pubescent; rhachis more slender; pedicels short, silky. *Spikelets* crowded, biseriate, ovate-apiculate, pubescent, 2.5 mm. long; lower glume .7 mm. long, membranous clasping, ovate-orbicular, 1-3-nerved, hispid; upper glume 1.5-2.5 mm. long, membranous, convex, ovate, sub-acute, 5-7-nerved, hispid. *Lower floret*; lemma up to 2.5 mm. long, like the upper glume but flatter; palea hyaline, flat, linear-oblong, shorter than the lemma. *Upper floret* hermaphrodite, 2.3

mm. sub-sessile; lemma pale, very convex, coriaceous, ovate or ovate-oblong, acute or shortly apiculate, delicately pitted, with margins narrowly incurved; palea coriaceous, back flat, ovate-oblong or elliptic-oblong, acute, often shortly apiculate, delicately pitted, margins much incurved.

Common in the NAGA, KHASI & JAINTIA HILLS, 2-6,000 ft.

5. *Brachiaria reptans* (L.) Gardner et Hubbard, in Hook. Ic. Pl. sub tab. 3363. Syn. *Panicum reptans* Lamk. Illus. I (1791) 171.

An annual or perennial grass. *Clums* 10-45 cm. long, creeping, rooting and sometimes branching at the base, slender, almost compressed, striate, glabrous, with pubescent nodes. *Leaves* spreading, rather numerous, ovate-lanceolate, lanceolate or cordate-lanceolate, acuminate, amplexicaul, thin, flat, 2.5-6.5 cm. long, .8-1.5 cm. wide, glabrous or with a few scattered hairs, scaberulous above, margins thickened, whitish, hispidulous; sheaths slightly compressed, striate, longer than the internodes, open, broad, glabrous, margins pubescent.

The panicle is made up of 5-9 racemes, at first erect, then spreading, alternate, sub-sessile, 1.5-3 cm. long; panicle-axis angular, scaberulous; rhachis of racemes similar, narrower than the spikelet, hispidulous on the margins, pubescent at the base; pedicels short, solitary or 2-nate, pubescent, often (always?) with long, white hairs enveloping the spikelet. *Spikelets* pale, crowded, ovate-acute or ellipsoid, glabrous, 1-2 mm. long; lower glume .4-.7 mm., membranous, clasping, ovate-cordate, slightly obtuse without nerves or 1-3-nerved; upper glume 1-2 mm. long, membranous, concave, ovate-acute, strongly 5-7-nerved. *Lower floret*; lemma equal and similar to the upper glume but flatter and broader, 5-nerved; palea, hyaline, oblong acute or obtuse, distinctly 2-nerved. *Upper floret* hermaphrodite, .7-1.7 mm. long, shortly stipitate, lemma pale, convex, coriaceous, ovate or obovate-elliptic, obtuse or shortly apiculate, foveolate rugose, with margins embracing the palea; the latter coria-

ceous with a flat back, foveolate, obovate or elliptic with inturned margins.

Common in the plains. The seed can be eaten.

6. *Brachiaria ramosa* Stapf, in Flor. Trop. Afr. IX. 542. Syn. *Panicum ramosum* Linn. Mant. I (1767) 29.

Annual, up to 60 cm. high. *Culms* fascicled, slender, geniculate, sub-erect or ascending from a prostrate and rooting base, terete, branched below, glabrous or finely pubescent. *Leaf-blades* linear-lanceolate from a rounded, often clasping base, finely acuminate, 5-12.5 cm. long, .6-1.6 cm. wide, soft, flaccid, glabrous or finely pubescent; margins sharply scabrid; sheaths thin, loose below, finely striate, glabrous, or with a few marginal cilia near the mouth, or finely pubescent all over; ligules a line of short white hairs.

Panicle narrowly oblong, 5-15 cm. long, of 5-many racemes; common axis angular, channelled, scabrid on the edges, glabrous or finely pubescent with here and there longer hairs, terminating in a spikelet. *Racemes* 3-5 cm. long, upper gradually shorter, straight or slightly flexuous, simple or the longer compound; rhachis triquetrous, slightly wavy to straight, scabrid on the angles, glabrous on the angles, glabrous or finely pubescent, with or without scattered long hairs; pedicels paired or fascicled or upwards solitary. *Spikelets* ovoid, sub-acute or apiculate, somewhat turgid, 3 mm. long, greenish, at length pale, or straw-coloured. *Glumes* unequal; lower broadly ovate-obtuse to sub-acute, clasping at the base 5-7-(rarely 3-) nerved; upper corresponding in size and shape to the spikelet, membranous, glabrous or finely pubescent, 7-(more rarely 5-) nerved, nerves distinct. *Lower floret* neuter, lemma similar to the upper glume, 5-nerved; palea oblong, truncate, delicate, more or less reduced. *Upper floret* hermaphrodite; slightly shorter than the lower, ovate in outline, sub-acute, pale brown when mature; lemma and palea crustaceous transversely rugose. *Caryopsis* broad-elliptic in outline, flat or slightly depressed on both sides up to 2 mm. long.

Occasionally found in the plains.

7. *Brachiaria setigera* (Retz.) C. E. Hubbard in Hook. Ic. Pl. sub tab. 3363. Syn. *Panicum setigerum* Retz. Obs. Bot. IV (1786) 15.

Perennial up to 1 m. high; innovations extravaginal with long thin pubescent cataphylls. *Culms* ascending from a prostrate, straggling base, simple or sparingly branched. *Leaf-blades* lanceolate from a rounded or sub-cordate and semi-amplexicaul base, tapering to an acute point, up to 15 cm. long, 2.5 cm. wide, flat, slightly rigid, pale green, glabrous and smooth on the surface; margins scabrid, undulate or crisped, long ciliate to the rounded base; sheaths tight, smooth and glabrous or with a few tubercle based hairs, margins densely villously ciliate, nodes pubescent to silky bearded; ligules reduced to a densely ciliate rim.

Inflorescence a panicle, long exserted, made up of 4-7 obliquely erect and spreading sessile or sub-sessile, spiciform, secund racemes; common axis slender 5-7.5 cm. long, semiterete below, flattened upwards, scaberulous on the angles, glabrous or with a few scattered hairs. *Racemes* moderately dense to almost loose, lower 5 cm. long; upper shorter; rhachis almost straight, rather flat, 2-4 mm. wide, hairy at the base, angles scabrid; pedicels reduced to sub-terete stumps, the longer of a pair up to 1.5 mm. long, usually a few bristles on the pedicels. *Spikelets* ovate-lanceolate, acutely acuminate, 5 mm. long, usually pubescent. *Lower glume* membranous, broadly-ovate, clasping at the base, acute, 1.5 mm. long, 3- sub 5-nerved; upper glume membranous, corresponding in shape and size to the spikelet, prominently 7-9-nerved. *Lower floret* barren; lemma very similar to the upper glume, somewhat flat on the back, 5-nerved; palea broad-oblong, acuminate, somewhat shorter than the lemma. *Upper floret* hermaphrodite, broad to rotundate-elliptic in outline, 2.5 mm. long, pale, very delicately wrinkled or granulate; lemma with a scaberulous mucro, up to .9 mm. long. *Anthers* 3, 1 mm. long.

GOALPARA.

8. *Brachiaria subquadripa* (Trin.) Hitch. in Lingnan Sc. Jour. VII (1929) 214. Syn. *Panicum subquadripa*

rum Trin. Gram. Panic. (1826) 145; Gram. Icon. (1829) 186.

An annual. *Culms* up to 45 cm. tall, finally erect from a creeping and rooting base, creeping extensively, very leafy almost to the base of the panicle, smooth and glabrous. *Leaf-blades* lanceolate-acuminate, 3-9 cm. long, 4-9 mm. wide, spreading, flat, margins often crisped, base rounded, almost amplexicaul, surfaces of the lamina glabrous or with scattered, stiff, appressed, white hairs, smooth or scabrid on the surfaces; margins always very scabrid; sheaths rather loose, usually slipping from the culms, markedly striate, margins densely ciliate, glabrous or hairy, smooth or scabrous; ligules a rigid of stiff white hairs.

Inflorescence a panicle of 4-6 racemes, 2.5-4 cm. long, rhachis flattened, glabrous; margins scabrid. *Spikelets* solitary on very short scabrid pedicels, glabrous, lanceolate-oblong, acute, greatest width just at the middle. *Lower glume* 2 mm. long, over 2 mm. broad, 7-nerved, clasping the base of the spikelet; upper glume 3.75 mm. long, membranous, oblong, acute, 7-nerved; lower floret neuter; lemma corresponding in size, shape and texture to the upper glume; palea reduced, hyaline. *Upper floret* hermaphrodite; 3 mm. long, seated on a thickened stipe; elliptic in outline, subcoriaceous or chartaceous, finely striate, punctate and transversely rugose, margins securely clasping the palea; palea of same texture and shape as the lemma, slightly smaller.

Plains of DARRANG.

9. *Brachiaria kurzii* A. Camus, in Lecomte, Flor. Gen. de l'Indo-Chine, Vol. VII, 438. Syn. *Panicum kurzii* Hook. f. F. B. I. VII (1897) 38.

An annual. *Culms* erect, decumbent and rooting at base. *Leaves* lanceolate, acuminate, cordate at the base, 5-8 cm. long, 8-18 mm. wide; margins crisped, long ciliate at the base and shortly so at the apex; sheaths with ciliate margins; ligules bearded.

Inflorescence composed of a few false spikes, 5-7.5 cm. long, very slender, distant, glabrous or nearly so; rhachis scabrous, bearing a few long hairs. *Spikelets* pale, sub-

sessile or pedicelled, ovate-acute, 2.5 mm. long glabrous; lower glume .8-1 mm. long, ovate, sub-obtuse, clasping, 3-5-nerved; upper glume 1.25 mm. ovate-acuminate, 7-nerved. *Lower floret* male or neuter; lemma 2.3 mm. long, ovate, acute, 5-7-nerved; palea 2.2 mm., pale, whitish, rather thick, rounded, oblong or sub-elliptic. *Upper floret* 2.25 mm. long, cartilaginous, rugose, elliptic-oblong, summit rounded and apiculate, with clasping margins; palea scarcely shorter than the lemma, cartilaginous, slightly angular.

Rare. So far only found at the foot of the GARO HILLS.

10. *Brachiaria miliiformis* (Presl) A. Chase, in Contrib. U. S. Nat. Herb. XXII (1920) 35. Syn. *Panicum miliiforme* Presl, Rel. Haenk. I (1830) 300.

Culms up to 80 cm. long, decumbent at the base and rooting, smooth and glabrous, slender, often branching below. *Leaf-blades* lanceolate 7-16 cm. long, acuminate, many nerved, glabrous, rarely with a few hairs; margins very scabrid, often a few cilia on the rounded base; sheaths striate, glabrous or sparsely hairy, margins densely ciliate, close, terete, a few hairs on the throat; ligule a ridge of dense white hairs.

Panicle made up of from 4-6 racemes. *Spikelets* solitary, rhachis flattish, striate and convex on the back, margins scabrid; pedicels of spikelets short, about $\frac{3}{4}$ the length of a spikelet, distinct from one another, more or less scaberulous. *Spikelets* glabrous, elliptic, or elliptic-oblong, acute, usually apiculate, rather plump, 3-4 mm. long. *Lower glume* membranous, wider than long, 2 mm. long, clasping the spikelet at the base, many nerved; upper glume membranous, corresponding in length and shape to the spikelet, 7-nerved. *Lower floret* neuter; lemma very similar to the upper glume in texture, shape and size, 5-nerved; palea oblong, hyaline, 2-nerved. *Upper floret* hermaphrodite; lemma elliptic, rather obtuse, 5 mm. long, coriaceous to crustaceous when mature; obscurely 3-nerved, vertically striate, minutely punctate, margins narrowly infolded embracing the palea; palea of the same texture as the lemma. *Caryopsis* up to 2 mm. long, obovate flattened.

In the plains of the ASSAM VALLEY.

11. *Brachiaria distachya* Stapf, in Flor. Trop. Afr. IX. p. 565. Syn. *Panicum distachyum* Linn. Mant. I (1767) 138.

Culms 5-50 cm. long, often rooting at the base, angular and channelled, branchy, robust or slender, glabrous, hairy at the nodes. *Leaf-blades* erect or spreading, linear-lanceo-acute or acuminate, rounded and almost amplexicaul at the base, thin, flat, 1.75-6 cm. long, 5-8 mm. wide, glabrous or with tubercle-based hairs, at least above; margins hispid, pale, glaucescent; sheaths carinate, striate, open, lax, glabrous or pubescent on the margins; ligule a thickened hairy ring.

Inflorescence a panicle, 2.5 cm. long, made up of 2-3 simple racemes, sub-conjugate, usually 2-3 cm. long. *Spikelets* elliptic-obovate, acute or sub-acute, short pedicelled, 2.5-3 mm long; lower glume 1.5 mm. long, very wide up to 2.3 mm., embracing the spikelet completely, 5-7-nerved; upper glume corresponding in size and shape to the spikelet; upper glume 2-3 mm. long, membranous, ovate-acute, acuminate, 7-nerved. *Lower floret* neuter; lemma similar to the upper glume in texture and length, 5-nerved; palea narrow hyaline. *Upper floret* hermaphrodite, shortly stipitate, 2.5-2.8 mm. long; lemma subcoriaceous, elliptic or oblong, flattened or convex on the back, punctate-striate, faintly 3-nerved; palea flat, similar in texture to the lemma, margins much incurved.

Common in the plains.

21. *STENOTAPHRUM* Trin.

Spikelets lanceolate to ovate-oblong, falling entire (sometimes tardily) from the rudimentary pedicels, solitary or 2-3, rarely more-nate, abaxial on the triquetrous rhachis of very short spikelike racemes, more or less sunk in hollows or chambers on the anterior face of a dorsally flattened, herbaceous or spongy, continuous or jointed, common axis, or the longer racemes at least closely appressed to it; lower floret male or reduced to an empty lemma; upper floret hermaphrodite. *Glumes* dissimilar, the lower mostly minute, scale-like, the upper almost or quite equalling the spikelet

and 5-7-nerved, or similar and then both small, scale-like. *Lower floret*; lemma corresponding in size and shape to the spikelet, as seen from the front, chartaceous to coriaceous 3-7- (rarely more) -nerved, nerves sometimes very obscure; palea if present almost as long as the lemma, 2-keeled. *Upper floret*; lemma chartaceous to sub-coriaceous with firm margins, faintly 3-5-nerved; palea sub-equal to the lemma and similar in substance, tightly embraced by the narrowly involute margins of the former, faintly 2-nerved. *Lodicules* 2. *Stamens* 3. *Styles* free or almost so, very slender; stigmas, long, slender, laterally exserted. *Caryopsis* broadly elliptic-oblong, dorsally compressed, plano-convex.

Creeping or prostrate perennial or tufted, erect annuals; sheaths more or less, often strongly, compressed, blades acute or obtuse. *False* spikes terminal and often peduncled tough or at length breaking up at the joints.

***Stenotaphrum dimidiatum* Brongn.** in Duperr. Bot. Voy. Coq. (1827) 127. Syn. *S. glabrum* Trin. Fund. Agrost. (1820) 176.

Perennial. *Culms* ascending from a creeping and prostrate base, up to 30 cm. high, internodes compressed glabrous, smooth. *Leaf-blades* folded in veneration, afterwards flat, exactly linear from a shortly contracted base, with sub-obtuse or rounded tips, 2.5-12.5 cm. long by .4-2.4 mm. wide, glabrous, scabrid on the margins close to the tip, otherwise smooth; sheaths compressed, keeled, all glabrous or ciliate upwards, very rarely loosely hairy all over; ligule a fringe of very short hairs.

False spikes solitary terminal on the primary and secondary culms, 4 cm.-12 cm. long, borne on a rather slender, glabrous peduncle; common axis glabrous, midrib wavy, stout, flat on the back and acutely keeled on the face, lateral angles herbaceously margined or winged, when seen from back, ribbon-like, alternately toothed or lobed, 2.5 mm. wide, distinctly chambered. *Racemes* sessile sunk in the chamber or shortly exserted, 3-5- (rarely 2- or 6-8-) spiculate; rhachis wavy or zigzag ending in a subulate point; pedicels reduced to very short, sometimes ciliate, stumps. *Glumes* very dis-

similar; lower glume a whitish, membranous to chartaceous, ovate-obtuse or rounded scale, nerveless, 1-1.5 mm. long, asperulous and ciliolate at the tip; upper glume convex to boat-shaped, semi-ovate or semi-elliptic in profile, acute, usually shorter than the spikelet, membranous, typically 7- but sometimes 9- or 11-nerved; glabrous or ciliolate towards the tip. *Lower floret* male; lemma corresponding in outline and size to the spikelet, more or less coriaceous, 5-7-nerved, glabrous or ciliate near the tip; palea somewhat shorter than the lemma. *Upper floret* hermaphrodite, as long as the lower or only very slightly shorter, lemma and palea lanceolate, acute or acuminate, thinly chartaceous, smooth, glabrous or more or less ciliate upwards, the former 5-nerved, the latter 2-nerved with rounded sides. *Stigmas* rather large.

Recorded from MYMENSINGH and will certainly be found in SYLHET.

22. SETARIA Beauv.

Spikelets oblong to ovate in outline in dorsal view, very convex on the back, flattened or slightly depressed in front, base oblique in profile, falling entire from the pedicels, subtended by 1- to many persistent bristles (modified branchlets), gathered into contracted, spike-like or more or less open panicles; lower floret male or barren and sometimes reduced to the lemma; upper floret hermaphrodite. *Glumes* membranous, unequal; the lower usually much smaller, ovate from a clasping base, mostly 3-5- (rarely 1- or 7-) nerved; upper similar to the lower but longer and corresponding in size and outline to the spikelet, membranous, 5- (rarely 7-) nerved, flat or depressed longitudinally; palea if fully developed almost as long as the lemma, oblong to elliptic-oblong, acute, sharply keeled or the keels marginate or narrowly winged. *Upper floret*; lemma very convex on the back or boat-shaped, more or less apiculate, crustaceous, very finely pitted or more often transversely rugose; palea almost equal to the lemma, similar in substance, embraced all along by the involute margins of the latter up to its more or less prominent keels. *Lodicules* 2, broadly cuneate. *Stamens* 3; styles distinct; stigmas laterally exerted upwards. *Caryopsis* tightly enclosed by the hardened palea and lemma, ellipsoid in outline.

Annual or perennial herbs with narrow, flat leaves and terminal, contracted, cylindrical, or more or less open panicles. *Spikelets* usually sub-tended by bristles.

Key to the species of *Setaria*.

- Leaf-blades folded fan-fashion between the primary nerves; inflorescence a loosely-spiculate panicle; spikelets solitary, each subtended by a single bristle. 1. *S. palmifolia*.
- Leaf-blades flat when expanded; inflorescence a false spike or narrow panicle; spikelets usually clustered and subtended by more than one bristle.
- Bristles retrorsely barbed. 2. *S. verticillata*.
- Bristles antrorsely barbed.
- Upper glume as long as the upper lemma; the latter quite smooth:—
- Spikelets persistent, lower floret epaleate. 3. *S. italica*.
- Spikelets deciduous; lower floret paleate. 4. *S. viridis*.
- Upper glume shorter than the upper lemma; the latter rugose:—
- Inflorescence a narrow panicle, lobed, especially in the lower part, tapering upwards:—
- Annual; spikelets up to 2 mm. long. 5. *S. intermedia*.
- Perennial; spikelets 2·5-3 mm. long. 6. *S. forbesiana*.
- Inflorescence a cylindric false-spike:—
- Spikelets 3 mm. long. 7. *S. glauca*.
- Spikelets up to 2·5 mm. long. 8. *S. pallide-fusca*.

The last two species are rather close together and the following gives their differences at greater length in order to aid identification.

- Spikelets 3 mm. long; upper lemma coarsely rugose, boat-shaped and slightly keeled upwards, broad and dorsally strongly curved on the back in profile. *S. glauca*.
- Spikelets 2·25 mm. long; upper lemma usually finely rugose, narrow and dorsally gently curved, not at all keeled. *S. pallide-fusca*.

1. *Setaria palmifolia* Stapf in Journ. Linn. Soc. XLII (1914) 186. Syn. *Panicum plicatum* Hook f. in F.B.I. VII (1897) 55.

A perennial grass. *Culms* 30 cm.-2·4 m. tall, erect or ascending from a branchy, woody rootstock, stout, leafy;

nodes strigillose; internodes 5-15 cm. *Leaf-blades* 15-60 cm. long, 1.3-7.5 cm. wide, linear-lanceolate, finely acuminate, chartaceous, glabrous or sparsely hairy, plicate between the numerous veins, base narrow; sheaths smooth or hispid, the margins naked, or ciliate near the top only; ligule of long hairs.

Inflorescence a panicle 30-60 cm. long, contracted, nodding; rhachis stout, angular, scabrid; branches usually alternate, distant (the lower 7.5-10 cm. long) filiform, suberect, bearing short, capillary, few-flowered branches and bristle-like flowerless ones. *Spikelets* 3 mm. long, sessile or shortly pedicellate, ovoid, acute or apiculate, glabrous. *Lower glume* broadly ovate, obtuse, 5-nerved, membranous, half as long as the spikelet; upper glume a little more than half as long as the upper lemma, ovate, obtuse, 7-nerved, membranous. *Lower floret* barren; lemma slightly longer than the upper lemma, ovate, shortly apiculate, membranous, empty; paleate or not, 5-nerved; the palea when present small, hyaline, narrowly ovate-acute; upper floret hermaphrodite; lemma crustaceous, ovate-oblong, acute or shortly apiculate, slightly transversely striate, pale yellow with strongly involute margins; palea ovate, acute, nearly as long as the lemma, faintly transversely striate and with incurved membranous margins.

Easily recognised by its lanceolate plicate leaves and open panicle. Spikelets soon deciduous. Essentially a forest grass and very common in plains and hills.

2. *Setaria verticillata* Beauv. Ess. Agros. (1812) 51.

Annual. *Culms* mostly loosely tufted, from a few cm. to 2 and even 3 m. high, more or less geniculately ascending, branched from the base or higher up, 4-9-noded, with nodes mostly exserted, lower, and often the intermediate, nodes usually compressed and the latter often deeply channelled on the side facing the branch, the uppermost (peduncle) not or not much longer than the preceding, slender, rough below the inflorescence. *Leaf-blades* linear or lanceolate-linear from a broad, slightly constricted and rounded, or from a narrow base, long tapering to an acute or sub-setaceous point, 5-30

cm. long; .5-1.5 mm. wide, thin, flat, often flaccid, green, usually loosely pilose with fine tubercle-based hairs, rough on the margins and frequently also on the nerves; leaf-sheaths thin, sub-herbaceous to herbaceous, the lower and intermediate usually compressed and keeled upwards, striate, finely and sparingly hairy upwards, or pubescent all over, rarely quite glabrous; ligule very short, truncate, ciliate.

Inflorescence an erect, straight or curved, or spirally twisted and curled, lobed, sub-cylindrical or continuous and cylindrical, false spike, 2.5-12.5 cm. long by .5-3 cm. wide (excluding the bristles), greenish, coarsely bristled; axis slender, angular, rough and often pubescent; branches spirally arranged, very close, terminating in a bristle; in robust specimens the lower up to 1.25 cm. long, bearing from the base mostly perfect spikelets in clusters of 2-3 or solitary, each cluster supported by few (4-2), or the solitary spikelet usually by 1 bristle, or all the branches short and reduced to sessile compound clusters; bristles rather coarse and downwardly angular, scabrid, retrorsely barbed, 5 mm.-1 cm. long; pedicels small stumps, tips discoid. *Spikelets* oblong or obtuse in back view, 2.5 mm. long, 1.25 mm. wide, pale green. *Lower glume* hyaline, broadly ovate and .8-1 mm. long, 1- to sub-3-nerved; upper glume membranous, equal to the upper floret, 5-7-nerved. *Lower floret* barren; lemma similar to the upper glume 5- to sub-7-nerved, palea small, hyaline or absent. *Upper floret* hermaphrodite, broadly oblong, sub-apiculate or obtuse, pale green or at maturity straw-coloured; lemma thin sub-coriaceous, finely granular or more or less finely rugulose; palea of the same texture. *Anthers* 1 mm. long. *Caryopsis* broadly elliptic in outline, white-translucent, over 1.8 mm.

Rather uncommon. NAGA & KHASI HILLS and plains.

3. *Setaria italica* Beauv. Ess. Agrost. (1812) 51.

An annual. *Culms* fascicled, erect or from a geniculate base, more or less stout, glabrous, scabrid below the panicle. *Leaf-blades* linear from a contracted base, tapering to a setaceous point, 15-45 cm. long, 7.5-10 mm. wide, flat, soft, green, glabrous, scabrid on the upper surface; margins finely

cartilaginous; sheaths more or less tight, glabrous, except for the finely ciliate margins, sometimes the lower sparingly hairy on back and sides; ligule a densely ciliate rim.

Inflorescence an erect or nodding, continuous and cylindric, or more or less lobed false spike, green or when mature, yellowish; rhachis rather stout, angled, more or less rough on the angles; branches spirally arranged or more or less whorled, tomentose at the base; branches and branchlets bearing sessile or sub-sessile involucre, each supporting a group of 2-4 spikelets; bristles 2-3, rarely more, to each cluster; pedicels short; tips discoid. *Spikelets* persistent, broadly oblong to broadly elliptic, obtuse in back view, 2.5-3.25 mm. long. *Lower glume* broadly ovate-acute or sub-acute, .8-1 mm. long 1-3-nerved; upper elliptic, concave, sub-acute or obtuse, 1.6-2 mm. long or more, 5-7-nerved. *Lower floret* barren; lemma similar to the upper glume, dorsally flattened or depressed, 5-nerved; palea a hyaline scale or absent; upper floret hermaphrodite; lemma as long as the spikelet and corresponding to it in shape, reddish or yellow at maturity, crustaceous, smooth or almost so; palea of the same texture. *Caryopsis* ellipsoid or globose-ellipsoid, 1.8-2.5 mm. long.

Cultivated throughout the hills up to 6,000 ft.

4. *Setaria viridis* Beauv. Ess. Agrost. (1812) 51, 178, t. xiii, fig. 3.

An annual grass. *Culms* loosely tufted, slender, weak, erect, or more often ascending from a geniculate base, branched from the base, upper node long exserted, very slender, smooth and glabrous, scaberulous below the inflorescence. *Leaf-blades* linear-lanceolate from a slightly constricted base, long tapering to a very slender point, 3-20 cm. long, 5-10 mm. wide, flat, soft, glabrous, scaberulous on the upper surface; margins scaberulous, cartilaginous; midrib slender; sheaths thin, terete, slightly keeled upwards, glabrous or ciliate upwards and scantily hairy with tubercle-based hairs; ligule reduced to a ciliate rim.

Inflorescence an erect, oblong or linear-cylindric, dense, continuous, false spike, 2-5 cm. long, greenish; rhachis terete,

angular, or sulcate, minutely and rigidly puberulous, often with some longer silky hairs; branches reduced to sessile or sub-sessile involucre each supporting a cluster of 2-6 spikelets, half being imperfect; bristles up to 14 in each cluster, somewhat unequal, straight or more or less flexuous, scabrid, up to 10 mm. long; pedicels reduced to short stumps with minute discoid tips. *Spikelets* oblong, obtuse in back view, semi-elliptic in profile, 2-2.5 mm. long, pale greenish. *Glumes* thinly membranous, very unequal, lower rotundate or rotundate-ovate, obtuse, one-fourth to one-third the length of the spikelet, 1-nerved; upper shape and size of the spikelet, 5-7-nerved. *Lower floret* barren; lemma similar to the upper glume but more or less depressed or flattened; palea a hyaline scale about .5 mm. long. *Upper floret* hermaphrodite; lemma oblong, sub-acute or obtuse, pale, thinly crustaceous, smooth or very delicately punctate. *Stamens* 3, anthers .5 mm. long. *Grain* broadly elliptic, very obtuse, plano-convex, 1.5 mm. long, greyish; hilum punctiform.

Found occasionally in Shillong, KHASI HILLS. Probably introduced.

5. *Setaria intermedia* Roem. et Schult. Syst. II (1817) 489.

An annual. *Culms* tufted, geniculate, linear, rarely erect, up to 1 m. high, glabrous, smooth or minutely scabrid below inflorescence. *Leaf-blades* linear from a narrow and slightly rounded base, tapering to a fine setaceous point, flat, flaccid, green, hairy, very rarely glabrous, rough on the margins; leaf-sheaths thin, ciliate along the margins, often bearded at the mouth, somewhat keeled and compressed; ligule reduced to a long-ciliate rim.

Inflorescence a straight or flexuous, more or less loose, interrupted or lobed, false spike, 2.5-10 cm. long, greenish; branches very variable, the lower intermediate up to 1.5 cm. long, the upper reduced to sub-sessile clusters or solitary spikelets supported by a bristle; clusters of usually 2 spikelets, one of which is perfect with few bristles; bristle antrorsely scabrid, usually 3.5 mm. long; pedicels minute stumps

with discoid tips. *Spikelets* broadly ovate to elliptic and sub-apiculate, rather oblique and sub-gibbous, up to 2.5 mm. long, pale-green or straw-coloured. *Lower glume* broadly or rotundate-ovate, acute to sub-acute, half as long as the spikelet, 3-5-nerved; upper similar but more elliptic, very concave and up to $\frac{2}{3}$ length of the upper floret, 5-7-nerved. *Lower floret* barren; lemma membranous, elliptic-oblong, sub-acute, dorsally depressed, 5-nerved; palea elliptic, slightly shorter than lemma, acute, keels marginate. *Upper floret* hermaphrodite; lemma boat-shaped, apiculate, not quite 1.25 mm. wide, rich yellow, when mature more crustaceous, sharply transversely rugose; palea similar in texture but only slightly rugose. *Caryopsis* rotundate-ovate in outline, obtuse, 1.5 mm. long, plano-convex, whitish; hilum punctiform; scutellum ovate, $\frac{3}{4}$ the length of the grain.

Rather uncommon. Found in the plains and also in the hills up to 3,000 ft.

6. *Setaria forbesiana* Hook. f. F. B. I. VII (1897)
81.

A perennial. *Culms* erect, stout, up to 2 m. tall, from a stout rhizome, occasionally lower nodes somewhat geniculate and emitting short roots, smooth or glabrous, except for a minute scabridity below the inflorescence, striate, leafy to the just below the inflorescence or with a long peduncle emerging from the uppermost leaf-sheath, simple or branched below; nodes dark in colour. *Leaf-blades* linear-lanceolate from a rounded base, flat, tapering to a fine point, 4-45 cm. long, 4 mm.-1.6 cm. wide, both surfaces covered with sparse hairs to almost glabrous, both surfaces very scabrid; margins not thickened, scabrid, median nerve very prominent below; sheaths rather loose and scarious below, keeled and rather tighter above, smooth and glabrous or covered with sparse hairs and rough; margins ciliate, often covered with tightly appressed hairs towards the top, collar dark coloured; ligule of long silky hairs.

Inflorescence a panicle, strict; rhachis stout, either narrowly pyramidal with erecto-patent lower branches .6-6 cm. long, or spiciform with short branches, rather open,

branches often 1 cm. or more apart and ending in a bristle; rhachis and branches angled, channelled and scabrid; spikelets seated on very short peduncles, ovoid, green, solitary or often near the rhachis joined by an imperfect floret; involucre of 1-few, or 0, bristles, 2.5-3.2 mm. long. *Lower glume* 1.5-3 mm., broadly ovate, acute or obtuse, clasping the base of the spikelet; upper glume 2.25 mm. long, 7-nerved, broadly ovate or orbicular, acute or obtuse, 7-9-nerved. *Lower floret* barren or male; lemma broadly ovate, obtuse, 7-nerved, 2.75 mm. long; palea elliptic, apex obtuse. *Upper floret* hermaphrodite; lemma ovate-acute, crustaceous, yellow or white, transversely rugose, margins sharply incurved; palea of the same texture and shape, 2.5 mm. long.

KHASI & JAINTIA HILLS, 2,4000 ft.

7. *Setaria glauca* Beauv. Ess. Agrost. (1812) 51.

Annual. *Culms* loosely tufted, geniculate, rarely erect from base, 30-60 cm. tall, or stunted, slender, or stout downwards, smooth or slightly rough below the inflorescence. *Leaf-blades* linear from a slightly contracted base, tapering to a slender point, 5-30 cm. long, up to 1 cm. wide, flat, flaccid, glabrous or with a few white hairs towards the base, slightly rough on the margins; leaf-sheaths thin, the lower compressed and finely keeled, upper terete, glabrous and smooth; ligule reduced to a ciliate rim.

Inflorescence an erect, dense, continuous, linear, cylindric, false spike up to 10 cm. long and 1 cm. wide, fulvous to rufo-fulvous; rhachis slender, terete, minutely pubescent; branches reduced to a sessile involucre each supporting a solitary perfect spikelet frequently with a more or less arrested companion. *Bristles* 6-8 to each involucre, slender, rigid, scaberulous, very unequal up to 1 cm. long, pale at base, fulvous upwards; pedicels reduced to small stumps with a discoid tip. *Spikelets* broadly oblong to elliptic in back view, 3.75 mm. long, pale green in flower, rather turgid when mature. *Lower glume* membranous, tightly appressed, rotundate-ovate, subacute to obtuse $\frac{1}{3}$ to $\frac{2}{3}$ the length of the spikelet, 3-nerved; of the same shape and texture, 5-nerved. *Lower floret* male, or in weak specimens barren, as long as the upper floret,

lemma membranous, 5-nerved, very flat, or somewhat depressed on the back; palea as long as the lemma or shorter, broadly elliptic, acute, keels marginate; perfect anthers up to 1.8 mm. *Upper floret* broadly boat-shaped, very convex on the back; lemma crustaceous, distinctly transversely rugose, yellow or almost orange; palea granular-punctate, with stout keels; anthers 1 mm. long. *Caryopsis* roundate-elliptic in back view; plano-convex; hilum punctate; scutellum ovate, more than half the length of the grain.

The grain can be eaten in times of famine. Fairly common in the hills and plains.

8. *Setaria pallide-fusca* Stapf et C. E. Hubbard,
Kew Bull. (1930) 259.

Annual. *Culms* tufted, usually 30-60 cm. high, sometimes more, often tinted, slender, smooth, except slightly scaberulous below the inflorescence, usually ascending from a geniculate base, glabrous. *Leaf-blades* linear, long tapering to a fine point, not or only slightly contracted at the base, 5-25 cm. long, 2.5-7.5 mm. wide, flat or often infolded, glabrous or with a few hairs towards the base, slightly rough on upper surface inside the margins; leaf-sheaths thin lower compressed and keeled, upper terete, smooth and glabrous; ligule, hyaline, truncate, lacerate-ciliate.

Inflorescence an erect, dense, continuous false spike, 1.5-7.3 cm. long, mostly rufous, rarely fulvous or purplish; rhachis slender, terete, sub-angular, minutely pubescent; branches reduced to sessile or sub-sessile, involucre each supporting a solitary perfect spikelet, frequently with an arrested companion; bristles about 8 to each involucre, fine to very fine, rigid or somewhat flexuous, scaberulous, 7.5 mm.-1 cm. long; pedicels reduced to small stumps with discoid tips. *Lower glume* $1/3$ - $2/3$ the length of the spikelet, 3-nerved, membranous, tightly appressed, rotundate to rotundate-obtuse, subacute or obtuse; the upper same texture and shape up to half the length of the spikelet, 5-nerved. *Lower floret* male or barren; lemma membranous, 5-nerved, depressed along the middle; palea as long as or slightly shorter than the lemma, elliptic-oblong to oblong, with marginate

keels, anthers if present up to 2.5 mm. long. *Upper floret* hermaphrodite, boat-shaped with a broadly rounded back; lemma thinly crustaceous, transversely rugose, yellowish-green with often brown tips; palea granular-punctate, anthers .9 mm. to 1.2 mm. long. *Caryopsis* elliptic-rotundate from the back, plano-convex, 1.6 mm. long, scutellum more than half the length of the grain.

An excellent fodder for all stock. The grain is edible. Very common all over the province in plains and hills.

23. PSEUDORAPHIS Griff.

Spikelets 2-flowered, narrow lanceolate, rounded, shortly pedicelled, obscurely articulated on their pedicels but persistent. *Lower glume* very small, suborbiculate, hyaline, without nerves; upper glume longer, sometimes equalling the spikelet in length, very long acuminate, subulate or aristate, 5-many-nerved. *Lower floret* male or neuter; lemma often shorter than the spikelet, lanceolate, acute, acuminate or aristate, 7-nerved, palea shorter than the lemma, hyaline, obscurely nerved. *Stamens* 3. *Anthers* short. *Upper floret* hermaphrodite or female, stipitate, very small; lemma oblong acute, flat, broadly coriaceous, feebly nerved; palea scarcely coriaceous, acute, margins involute but not auricled, not nerved; lodicules wedge-shaped. *Caryopsis* linear-oblong, compressed, free between the coriaceous lemma and the hyaline palea.

Glabrous, or nearly so, herbs, aquatic or living in swamps. *Leaf-blades* linear or lanceolate, flat. The inflorescence is a terminal, peduncled, simple, panicle, with each long, filiform branch produced beyond the terminal spikelet into a scabrous bristle.

Key to the species of *Pseudoraphis*.

Spikelets 8-10 mm. long.	..	..	1. <i>P. brunoniana</i> .
Spikelets 3.5-4 mm. long	..	..	2. <i>P. minuta</i> .

1. ***Pseudoraphis brunoniana* Griff.** Notul. ad Plant. Asiat. III (1851) 29. Syn. *Chamaeraphis spinescens*

Poir. Encycl. Suppl. II (1811) 189, var. *brunoniana* Hook. f. F. B. I. VII (1897) 62.

A floating grass forming extensive patches. *Culms* 30-90 cm. long, ascending, extended, very branchy, striate, nodes numerous, the lower kneed. *Leaf-blades* flat, narrowly linear-lanceolate, narrow at the base, smooth or scabrid, 2.5-7.5 cm. long; sheaths long, lax, pubescent on the throat, margins devoid of cilia; ligules hairy.

Inflorescence a pyramidal panicle, contracted then spreading, 5-10 cm. long; axis and branches angular, furrowed, almost smooth and scabrid-hispid, flexuous or nearly so, lower branches 2.5-3 cm. long, terminated by a bristle often 1.5-2 cm. long; pedicels short, thick, obconic. *Spikelets* 1 to 2, rarely 3 on the branches of the panicle, lanceolate, 8-10 mm. long, long awned; lower glume .8-1 mm. thin, whitish, orbicular, truncate or reniform, clasping; upper glume 8-10 mm. long, awned, or long-acuminate; oblong, scabrid on the convex back, smooth or with silky hairs on the sides; awn scabrid, sometimes as long as the spikelet. *Lower floret* male or neuter; lemma 7-8 mm., finely acuminate, awned, many nerved, margins thin, clasping the palea; palea 4-5 mm. hyaline, margin infolded. *Upper floret* hermaphrodite; lemma 2.5-3 mm. long, coriaceous-papyraceous, narrow, linear-oblong, acute, embracing the palea; palea a little shorter and as broad, thin, oblong. *Caryopsis* ovate-oblong, less than 1.5 mm.

SYLHET & MYMENSINGH.

2. *Pseudoraphis minuta* (Mez) Pilger in Notiz. Bot. Gart. Berlin, X, (1927-30) 210. Syn. *Chamaeraphis gracilis* Hack. apud Hook. f. F. B. I. VII (1897) 62 non Hack. in Engl. Jahrb. VI (1885) 236.

Perennial. *Culms* 20-35 cm. long, very slender, compressed, often simple, glabrous, 3-6-noded, the lower nodes hairy. *Leaf-blades* soft, flat, green, spreading, linear-acuminate, base slightly contracted, 2.5-4 cm. long by 3-4 mm. wide, often glabrous; sheaths broad, lax, keeled, compressed, much shorter than the internodes, glabrous, save at the throat and at the base; ligules very short, hyaline, toothed.

Inflorescence an oblong panicle, very lax, contracted, slender, soft, shortly exserted from the sheath of the uppermost leaf, 4·5-5 cm. long; rhachis filiform, angular, scabrous towards the summit; branches often 2-nate, erect, spreading, unequal, usually simple, almost capillary, angular, very scabrid, sub-flexuous, carrying 5-10 spikelets; awn terminal, scabrid, 3-5 mm. long. *Spikelets* distant, alternate, lanceolate, flat on one side, very convex on the other, glabrous, 3·5-4 mm. long, green or slightly-brown; pedicels very short; lower glume extremely short, membranous, rounded truncate, 3-nerved; upper glume 3·5-4 mm. long, ovate, finely acuminate, cuspidate, with 7-9 strong, green, scabrid, glabrous or hairy nerves. *Lower floret* male or neuter; lemma 2·2-5 mm. long, membranous, ovate-sub-acute, 7-9-nerved; palea a little shorter, hyaline, oblong, sub-elliptic, 2-nerved. *Upper floret* hermaphrodite; lemma 1·2 mm. long, oblong-acute, sub-chartaceous, translucent; palea ovate-oblong, acute, of the same texture as the lemma. *Caryopsis* elliptic-lanceolate, whitish, grooved on one face.

Bils in the Surma VALLEY.

24. PENNISETUM L. Rich.

Spikelets lanceolate to ovate, or ovate-oblong to elliptic-oblong, acute or obtuse, sessile or short pedicelled, solitary or in fascicles of 2-5, surrounded by and deciduous* with the sessile or peduncled involucre formed of few to many naked or hairy bristles, arranged round the slender to stout rhachis of spikelike often cylindrical panicles; lower floret male or barren with or without a palea; upper floret hermaphrodite. *Glume* sub-equal or lower usually smaller. *Lower floret*; lemma as long as or shorter than the spikelet, palea narrow, 2-keeled. *Upper floret*; lemma as long as the spikelet or shorter, 5-7-nerved, palea similar to that of the lower floret. *Lodicules* minute or absent; stamens 3, anthers linear or oblong, with naked or penicillate tips. *Styles* slender, connate or free, stigmas usually free, terminally or laterally exserted.

Cæspitose or stoloniferous perennials or annuals; culms simple or often profusely branched. *Leaf-blades* linear to

lanceolate, flat, folded or convolute; ligule reduced to a ciliate rim. *False spikes* solitary (or fascicled) usually dense, linear or linear-lanceolate, rarely oblong; branches very numerous, short, leaving scars as they fall away; bristles very slender or capillary.

* Persistent in cultivated forms.

Key to the species of *Pennisetum*.

Lemmas more or less alike:—

Spikelets usually solitary in each involucre;
bristles sparingly ciliate. 1. *P. alopecuroides*.

Spikelets 1-4 in each involucre; bristles, at least the inner, plumose:—

Anther tips glabrous; inflorescence enclosed in the upper leaf-sheath. 2. *P. clandestinum*.

Anther tips bearded; inflorescence exerted:—

Panicle stout; cultivated for its grain;
annual. 3. *P. typhoides*.

Panicle slender; cultivated for fodder;
perennial. 4. *P. purpureum*.

Lemmas heteromorphous. 5. *P. polystachyon*.

1. *Pennisetum alopecuroides* Spreng. Syst. I. (1825) 303. Syn. *P. compressum* R. Br. Prod. (1810) 195.

Perennial. *Rhizome* knotty, woody, with many strong roots. *Culms* 30-60 cm. high, erect, simple, densely tufted, closed, rounded, glabrous save below the inflorescence a number of white hairs. *Leaf-blades* erect, rolled, linear, long acuminate, compressed, striate, glabrous save at the base, 30-45 cm. long by 4-6 mm. wide, margins slightly scabrid; sheaths open to near the base, lax compressed, keeled, striate, glabrous, pubescent on the margins; ligules very short, fimbriate in upper leaves, membranous in lower.

The panicle is linear-oblong in shape, green or purple, 5-60 cm. long; rhachis angular, furrowed, hairy; pedicels erect, hairy, thick at the summit, 1.5-2 mm. long; involucre pedicelled, of 12-15 bristles, which are pale or purplish-black, flexuous, erect, spreading, scaberulous, all free at the base, unequal, attaining 2.5 cm. in length. *Spikelets* linear-

oblong, acute, erect or spreading, 1-2-nate, 7-8 mm. long. *Lower glume* very short, membranous, ovate or sub-orbicular; upper glume membranous, 3·5-4 mm. long, ovate-lanceolate, acute, 3-5-nerved. *Lower floret* neuter; lemma 6·5-7·5 mm. long, closely enveloping the upper floret; palea absent. *Upper floret* hermaphrodite; lemma 7-8 mm. long, papyraceous, membranous on the margins, ovate-lanceolate, acute, obscurely 5-7-nerved, clasping the palea; palea 6·5-7·5 mm., membranous on the margins. *Caryopsis* blackish-brown, ovate, crowned with the styles.

NAGA HILLS, 4-5,000 ft. The grain can be eaten in times of want.

2. *Pennisetum clandestinum* Hochst. ex Chiov. in Ann. Istit. Bot. Rom. VIII (1903) 41.

A perennial grass with numerous creeping rhizomes and slender or stout stolons rooting at the nodes. *Culms* very short usually appressed to or hardly raised above the ground, copiously branched. *Leaf-blades* linear, tapering to an obtuse tip, up to 12 cm. long, 3-6 mm. wide when flattened, tightly folded at first afterwards opening, spreading, rather succulent, more or less glaucous, glabrous or sparingly and shortly hairy, smooth except on the margins and midrib near the tip; leaf-sheath closely imbricate, short, almost membranous, pale, glabrous or shortly hairy; ligule a densely ciliate rim.

Inflorescence reduced to a cluster of 2-4 (mostly 3 or rarely 1) spikelets, sub-sessile and enclosed for the greater part in the uppermost leaf-sheath, the terminal spikelet shortly pedicelled the other sessile; bristles delicate, finely scaberulous or ciliolate, those of the involucre of the terminal spikelet up to 15, very unequal in length, the longest $\frac{3}{4}$ the length of the spikelet, of the lateral spikelets fewer and only on the outer side of the spikelet. *Spikelets* linear-lanceolate, 15-20 mm. long, glabrous, whitish below, greenish upwards. *Lower glume* a very minute, hyaline, nerveless scale often suppressed; upper ovate to ovate-rotundate, up to 2·5 mm. long, or rarely linear-lanceolate and up to 10 mm. long, hyaline nerveless or obscurely few-nerved. *Lower floret*

barren and reduced to the lemma; lemma lanceolate, long tapering, sub-acute, as long as the spikelet, thinly membranous, 8-12-nerved; palea absent. *Upper floret* hermaphrodite and markedly protogynous or functionally female with rudimentary stamens; lemma very similar to that of the lower floret but slightly shorter; palea linear-lanceolate, long-acuminate, very thin, 2-4-nerved. *Lodicules* 0. *Stamens* in the hermaphrodite floret with very long protruding filaments up to 5 cm. long and dangling anthers 5.7-5 mm. long, in the female floret much reduced with empty anthers which remain permanently enclosed. *Style* long exerted up to 40 mm. long, simple or shortly bifid, finely plumose from below the middle upwards. *Grain* oblong ellipsoid 2.5-3 mm. long, brown.

This grass has been introduced into ASSAM from AFRICA as a fodder grass. It is known as "Kikuyu grass."

3. *Pennisetum typhoides* Stapf & Hubbard in Kew Bull. 1933, 271. Syn. *Alopecurus typhoides* Burm. Fl. Ind. (1768) 27; *Pennisetum typhoideum* L. Rich in Pers. Syn. I (1805) 72 (in part).

Annual. *Culm* erect up to 3 m. tall, slender or stout, simple or branched, nodes hairy above, culm tomentose below the inflorescence, otherwise glabrous, smooth. *Leaf-blades* linear to linear-lanceolate, acute, 15-60 cm. long, 9 mm.-4 cm. wide, flat, glabrous or loosely hirsute, smooth or scaberrulous; sheaths ciliate on the margins and in case of upper leaves densely bearded at junction with blades, glabrous and smooth, or hirsute and rough; ligule a dense fringe of hairs.

False spike cylindric or tapering towards base and apex, 6-32 cm. long, not or slightly bristly, pale and brown or purple, rhachis slender to stout villous, closely beset with the stalked persistent involucres. *Stalks* 1-8 mm. long, densely pilose; bristles up to 70 to each involucre, very slender, inner stout, plumose round spikelet with silky hairs, 4-7 mm. long, sub-equal. *Spikelets* in clusters of 2-5 or solitary, pedicelled (with the pedicel .5-1.5 mm. long), oblong or elliptic-oblong 2.5-5 mm. long. *Glumes* broad, truncate or very obtuse, hyaline and thinly membranous, ciliolate at the

apex; lower $\cdot 5\text{--}1\cdot 5$ mm. long, nerveless; upper $\cdot 7\text{--}2\cdot 5$ mm. long, nerveless or 3-nerved. *Lower floret* male or barren; lemma when flattened elliptic-oblong to broadly oblong, truncate or emarginate, sometimes mucronulate, $1/3$ the length to almost as long as the spikelet, 1-5-nerved, glabrous or ciliolate at the apex; palea as long as the lemma, narrowly oblong truncate, scaberulous on the keels, or suppressed. *Upper floret* hermaphrodite, frequently disarticulating from the rest of the spikelet at maturity; lemma ovate to broadly ovate-elliptic, obtuse, as long as the spikelet, coriaceous, 5-7-nerved, minutely pubescent on the margins, smooth and shining on the back below the strongly nerved tip; palea lanceolate, truncate, as long as the lemma, glabrous and smooth on the back, pubescent on the flaps. *Anthers* 3 mm. long. *Caryopsis* obovoid or obovoid-ellipsoid $2\cdot 5\text{--}3$ mm. long, tip pale grey or greyish white.

Cultivated in UPPER ASSAM and occasionally met with as an escape.

4. *Pennisetum purpureum* Schum. et Thonn. Beskr. Guin. Pl. 64.

A perennial grass from a creeping rhizome. *Culms* erect, tufted, 2-3 m. tall, branched; branches erect, terete, glabrous, smooth; nodes exserted from the sheaths, glabrous or more often with a ring of stiff, long, appressed hairs. *Leaf-blades* linear, tapering to a setaceous point, 30-75 cm. long by 2-5 cm. wide, dull green, glaucous or tinged with purple, more or less rough on both sides, glaucous beneath, usually more or less hairy above, especially towards the base; hairs tubercle-based; margins spinulosely scabrid; sheaths terete, clasping the stem, striate, glabrous and smooth, or pubescent to hirsute with tubercle-based hairs near the tip; ligule a narrow rim bearing a dense fringe of white hairs 2-3 mm. long.

Inflorescence a dense, cylindric, erect false spike, 8-30 cm. long and $1\cdot 5\text{--}3$ cm. in diameter, yellow or tinged with brown, purple or blackish-purple, made up of deciduous spikelets or fascicles of spikelets, each spikelet or fascicle surrounded by an involucre of numerous bristles of

unequal length, mostly 4-8 mm. long, one usually very much longer, scabrid, one or several of the innermost and longest sparingly plumose towards the base, rarely all naked. *Spikelets* sessile or if in fascicles of 2-4 the lateral pedicelled, all lanceolate, more or less acuminate, 5-7 mm. long, glabrous, straw-coloured or tinged with brown or purple, hermaphrodite, or if fascicled the lateral male, rarely neuter or all hermaphrodite. *Lower glume* suppressed or rudimentary, upper ovate to ovate-lanceolate, .5-1 mm., rarely 2 mm. long, sub-hyaline, 1-nerved or nerveless. *Lower lemma* male or more often barren, lanceolate, acute or acuminate, half as long as the upper glume, 3-nerved, rarely 1-7-nerved; palea linear-lanceolate, 2-nerved, shorter than the lemma or quite suppressed. *Upper floret* hermaphrodite; or male in lateral spikelets, lemma lanceolate-acuminate, scaberulous upwards, usually 5-nerved; palea narrow, linear-lanceolate, tips minutely 2-toothed. *Lodicules* 0. *Anthers* 2.5-3 mm. long, tip minutely penicillate. *Styles* united, stigma slender 4 mm. long.

A very valuable fodder grass introduced into ASSAM from AFRICA.

5. *Pennisetum polystachyon* Schult. Mant. II (1824) 147. Syn. P. borbonicum Kunth, Rev. Gram. I (1815) 259.

A perennial or rarely an annual. *Culms* erect or geniculately ascending, sometimes rooting at the lower nodes, 2 m. or more high, slender to stout, terete, branched or rarely simple, usually glabrous, scaberulous towards the inflorescence, otherwise smooth. *Leaf-blades* linear to lanceolate, rounded or narrowed at the base, acute, up to 45 cm. long, 3-15 mm. wide, flat, flaccid or firm, scaberulous or smooth below, densely hirsute behind the ligule; margins at base ciliate, otherwise glabrous, or loosely to densely pilose with spreading tubercle-based hairs.

False spike cylindric, very dense to somewhat lax, straight or flexuous, erect or nodding, 2.5-25 cm. long, purple, reddish-brown or orange-brown; branches slender, angled, glabrous, scaberulous, scarred; involucre sub-sessile;

bristles up to 30 for each involucre, slender, densely ciliate around spikelet, scaberulous above, one bristle stouter than the rest and up to 3 cm. long, the remainder varying up to 9 mm. *Spikelets* solitary, sessile, oblong-acute, 4-5 mm. long, glabrous. *Lower glume* linear or lanceolate, acute or obtuse, .5-1 mm. long, hyaline, nerveless, or suppressed; upper, when flattened, oblong or elliptic-oblong, acute, acuminate or mucronate, or 3-lobed, thin membranous, 5- (rarely 7-) nerved, papillose above the middle. *Lower floret* male or barren; lemma 3-4 mm. long, 3-lobed with the lobes equal and obtuse or with the middle lobe erect and shorter or longer, otherwise similar to the upper glume; palea linear, obtuse, up to 3.5 mm. long, keels scaberulous or smooth, or palea absent. *Upper floret* hermaphrodite, lanceolate-obtuse, lemma when flattened ovate-oblong, truncate, 2-3 mm. long, chartaceous, shining, obscurely 5-nerved, ciliate at the apex; palea rather similar to the lemma. *Lodicules* 0. *Anthers* 1.75-2 mm. long with glabrous tips. *Styles* free or connate at the base. *Caryopsis* oblong or elliptic-oblong, 1-2 mm. long.

This species is represented from ASSAM by one sheet in the Kew Herbarium. It has not been collected since and is very doubtfully a native of India.

25. RHYNCHELYTRUM Nees.

Spikelets laterally compressed and keeled, falling entire from the capillary pedicels of a compound or decompound panicle. *Florets* 2; the lower usually male, the upper hermaphrodite. *Glumes* dissimilar, usually more or less distant, the lower ranging from an annular ciliate rim to an ovate-oblong scale, one-third the length of the spikelet, 1-nerved or nerveless; upper as long as the spikelet, frequently dorsally gibbous below the middle, emarginate, rarely entire, mucicous, mucronate or awned from the sinus 5-rarely 7-nerved, villous to pubescent, rarely glabrous below. *Lower floret*; lemma similar to the upper glume or dissimilar, palea as long as the lemma, 2-keeled; keels ciliate or scaberulous. *Upper floret*; lemma smaller than the lower, ovate to elliptic-oblong, truncate, emarginate, membranous to thinly

chartaceous, 3-5-nerved, glabrous and very smooth; palea as long, 2-nerved. *Lodicules* 2, very small. *Stamens* 3. *Caryopsis* oblong-ellipsoid.

Annual or perennial grasses with linear or filiform leaf-blades. *Panicle* open or contracted. *Spikelets* often clothed with brightly coloured hairs.

Rhynchelytrum repens (*Willd.*) *C. E. Hubbard* in *Kew Bull.* (1934) 110. *Syn. Tricholaena rosea* Nees, *Cat. Sem. Hort. Vratisl.* (1835), (in part).

A tufted annual or perennial grass. *Culms* erect from a geniculate base, often rooting from the lower nodes, up to 1 m. tall, terete, simple or branched, glabrous and smooth or pubescent. *Leaf-blades* narrowly linear to linear, long and finely acute, 5-30 cm. long, 2.5-12.5 mm. wide, flat or folded, green or glaucous, glabrous to pubescent; sheaths finely striate or smooth, glabrous or hairy, tight or loose; ligule a minutely ciliate, membranous rim, 2.5 mm. long.

Inflorescence an oblong, ovate or pyramidal panicle, 5-20 cm. long, effuse or contracted, silvery-white, purplish or cream, silky-hairy; rhachis slender, terete or channelled on one side, glabrous or pubescent at the nodes; branches paired or solitary; branchlets capillary; pedicels with discoid tips. *Spikelets* ovate to broadly oblong, 3.1-7.5 mm. long, pale, greyish-brown or dark-brown, silkily pilose to villous, with, at first appressed eventually spreading silky, white or purplish hairs, smooth or densely tuberculate. *Lower glume* linear to oblong, obtuse, truncate or emarginate, 1-2 mm. long, membranous, 1-nerved, densely bearded at the base, pilose; upper glume .6 mm. above the lower, as long as the spikelet, semi-ovate in profile, tapering into a beak, shortly and obtusely 2-lobed, mucronate or with an awn up to 5 mm. long, chartaceous, 5-nerved, densely villous, hairs exceeding its length; margins ciliate. *Lower floret* male or barren; lemma similar to the upper glume; palea lanceolate 3.4-4 mm. long, membranous, keels ciliate. *Upper floret* hermaphrodite; lemma elliptic-oblong when flattened, emarginate 2.5-3 mm. long, thinly chartaceous, 5-nerved, glab-

rous; palea as long or almost as long, 2-nerved. *Grain*
1 mm. long.

Considered to be a weed in SOUTH AFRICA, in INDIA it has
some repute as a fodder grass and has been introduced into ASSAM.
It is known as "Natal grass."

18. ANDROPOGONEÆ.

Annual or perennial herbs, frequently with tall culms; leaf-blades linear to lanceolate or ovate; spikelets usually in pairs (rarely in threes or solitary), one of each pair (or three) sessile, the other (or both) pedicelled, those of each pair (or three) similar or more often dissimilar, 2-flowered with the lower floret male or barren and the upper hermaphrodite or female, or male or barren in the pedicelled spikelets, or the latter suppressed and with only the pedicel present, falling entire at maturity with the joints of the usually articulate rhachis of solitary, digitate or paniced spike-like racemes; rhachilla not produced beyond the upper floret; glumes more or less rigid and firmer than the lemmas, the lower always longer than the florets; lemmas membranous or hyaline, the upper usually with a geniculate awn from the entire or the sinus of the 2-lobed tip; paleas shorter than the lemmas, frequently the lower or both suppressed; lodicules usually 2; stamens 3, rarely 1 or 2.

Key to the genera of *Andropogoneæ*.

Internodes of the rhachis and pedicels slender, filiform; rarely thickened upwards; or if thickened upwards spikelets 1-flowered and awned :—

Spikelets all alike (or very similar) in shape and sex, or the pedicelled spikelets suppressed; spikelets 1-2-flowered : (*lower floret absent in M. monanthum, glume dorsally deeply channelled*) :—

Spikelets arranged in more or less compound panicles of spike-like racemes; spikelets awnless or awned, often surrounded by silky hairs :—

Spikelets all pedicelled; rhachis of racemes continuous and tough :—

Racemes peduncled; spikelets awned. **1. *Eccoilopus*.**

Racemes sessile :—

Spikelets awnless; racemes in a spiciform or contracted silvery panicle.

2. *Imperata*.

- Spikelets awned; racemes on an elongated axis, rarely sub-digitate. **3. Miscanthus.**
- Spikelets paired, one sessile the other pedicelled, or if both pedicelled, then glumes coriaceous :—
- Spikelets all pedicelled; rhachis of racemes tough, spikelets awned. .. **4. Sclerostachya.**
- Spikelets with one sessile and the other pedicelled; rhachis of racemes fragile :—
- Spikelets usually awnless :—
- Glumes coriaceous or chartaceous throughout; panicles narrow, villous to tomentose. .. **5. Narenga.**
- Glumes membranous, or only chartaceous at the base; panicles wide, silky-hairy. .. **6. Saccharum.**
- Spikelets awned; glumes thin; panicles silky-hairy. .. **7. Erianthus.**
- Spikelets arranged in digitate or scattered or solitary racemes :—
- Spikelets paired, one sessile and the other pedicelled or both pedicelled :—
- Racemes digitate, paired or scattered :—
- Leaf-blades mostly lanceolate to linear-lanceolate, often contracted at the base, lower glume rarely villous; lower glume with a narrow median groove; culms mostly decumbent. .. **8. Microstegium.**
- Leaf-blades usually linear, usually gradually passing into the sheaths; lower glume more or less villous; lower glume without a median groove :—
- Spikelets 2-flowered; lower glume 2-3-toothed. .. **9. Eulaliopsis.**
- Spikelets 1-flowered; lower glume not 2-3-toothed :—
- Lower glume dorsally flattened or shallowly concave between the keels; upper lemma wider than the awn, 2-toothed at the apex; rhachis fragile; perennials. .. **10. Eulalia.**

Lower glume convex on the back
at least at maturity; upper
lemma stipitiform; rhachis more
or less persistent; annuals. ..

11. Pseudopogonatherum-

Racemes solitary; upper glume and
lower lemma both awned. ..

12. Pogonatherum.

Spikelets solitary, 2-flowered, sessile;
pedicelled spikelets reduced to their
pedicels.

13. Apocopsis.

Spikelets of each pair different in sex and
usually also in shape and size, the pedicelled
male or barren :—

Racemes paired, digitate, scattered or in
panicles :—

Racemes espatheate :—

Upper lemma of the sessile spikelet
awned from the tip or from the sinus
of the two-lobed tip; culms erect or
geniculate; leaf-blades mostly linear :—

Racemes usually arranged in pani-
cles or in whorls along the main
axis :—

Pedicels without a translucent line;
upper lemma awned from the sinus
of 2-lobes :—

Spikelets dorsally compressed;
lower glume more or less
flattened on the back :—

Racemes few-noded. .. **14. Sorghum.**

Racemes many-noded. .. **15. Pseudosorghum.**

Spikelets laterally compressed or
terete; lower glume rounded on
the back, often muriculate :—

Racemes composed of many
pairs of spikelets. .. **16. Vetiveria.**

Racemes usually composed of
1-sessile and 2-pedicelled
spikelets. **17. Chrysopogon.**

Pedicels with a median translucent
line; upper lemma awned from
the tip.

18. Capillipedium.

Racemes digitate, sub-digitate or
scattered :

Sessile spikelets of all pairs
hermaphrodite and awned; lower
glumes or sessile spikelets narrow,
the latter not closely imbricate. ..

19. Bothriochloa.

Sessile spikelets of lowest 1-3 pairs male or neuter, awnless; lower glumes of sessile spikelets broad, the latter closely imbricate. .. **20. Dichanthium.**

Upper lemma of sessile spikelets awned from low down on the back; dwarf grasses often with prostrate or ascending culms; leaf-blades short, lanceolate to ovate. .. **21. Arthraxon.**

Racemes supported by spathes :

Column of awn glabrous; lower glume of sessile spikelet 2-keeled :

Not aromatic; racemes paired or digitate, terminating the culm (and its branches); lowest pair of spikelets usually heterogamous. .. **22. Andropogon.**

Aromatic; racemes paired, in compound panicles; lowest pair of spikelets homogamous. .. **23. Cymbopogon.**

Column of awn hairy; lower glume of sessile spikelet rounded on the sides. **24. Hyparrhenia.**

Racemes solitary :

Racemes of several pairs of spikelets, evenly spaced :

Column of awn glabrous, lower pairs of spikelets heterogamous, dissimilar, the sessile awned; rhachis fragile throughout. .. **26. Schizachyrium.**

Column of awn hairy; lower pairs of spikelets homogamous, similar, awnless, the rhachis tough between them. **27. Heteropogon.**

Racemes of few pairs of spikelets, the lower 2 or more pairs male or neuter and forming a false involucre around the remainder :

Involucral spikelets persistent, short pedicelled or sessile, the inner spikelets deciduous; callus of fertile spikelets pointed. ..

Involucral spikelets usually 4, with 1 male flower or barren. .. **28. Themeda.**

Involucral spikelets 6-9, with 2 male flowers. .. **29. Germainia.**

Involucral spikelets (4) deciduous, pedicels long; callus of fertile spikelets very short, truncate or obtuse. **30. Iseilema.**

Internodes of the rhachis usually stout and thickened upwards or throughout, or flattened; pedicels often similar to the internodes; spikelets 1-2-flowered; upper lemma awned or awnless.

Spikelets solitary, awned, very short-pedicelled, on the continuous rhachis of slender second spike-like racemes.

31. Dimeria.

Spikelets paired, one sessile and the other pedicelled, rarely the pedicelled spikelet reduced to the pedicel:

Upper lemma usually awned (sometimes awnless in *Apluda*):

Racemes composed of several to many internodes and pairs of spikelets:

Racemes paired, digitate or sub-digitate.

32. Ischaemum.

Racemes solitary.

33. Sehima.

Racemes reduced to 3 spikelets, partially enclosed by spathes.

34. Apluda.

Upper lemma always awnless:

Lower glume of all spikelets long-tailed, with the tail flat; racemes digitate or solitary; aquatic grasses with floating culms.

35. Vossia.

Lower glume not long-tailed:

Racemes several to many, very fragile; glumes quite smooth.

36. Thyrsia.

Racemes always solitary:

Spikelets in pairs or threes:

Racemes tough or very slowly disarticulating; spikelets more or less alike.

37. Mnesithea.

Racemes readily disarticulating; spikelets more or less dissimilar:

Each internode of the rhachis with 2 sessile spikelets, at least in the lower part of the spike.

38. Hemarthria.

Each internode of the rhachis with one sessile and 1 pedicelled spikelet:

Sessile spikelets globose, pitted.

39. Hackelochloa.

Sessile spikelets not globose, unpitted:

Racemes cylindrical, symmetrical; spikelets different.

40. Rottboellia.

Racemes compressed, one-sided; spikelets similar. ...

41. *Coelorhachis*.

Spikelets solitary, sessile, the pedicelled suppressed; pedicels fused

with the internodes of the rhachis. 42. *Ophiuros*.

1. ECCOILOPUS Steudel.

Spikelets fusiform, disarticulating from the pedicels and leaving the rhachis and pedicels intact, 2-flowered. *Glumes* herbaceous, membranous to chartaceous, 7-9- (occasionally 12-) nerved, 2-toothed or shortly awned at the tip, hairy and scabrid on the back. *Lower floret* male or empty; lemma oblong; tip rounded, scaberulous; palea present or absent. *Upper floret* hermaphrodite; lemma hyaline, cleft to below the middle, awned; awn up to twice the length of the spikelet; palea hyaline, broadly lanceolate.

Tall grasses. *Leaf-blades* long, flat, scabrid, hairy, sparsely spreading; sheaths sub-compressed, striate, glabrous; ligule oblong, membranous. *Inflorescence* an oblong or ovate-oblong panicle; branches whorled, naked at the base, flowering towards the tips; pedicels clavate, with cupped tips, long and short.

Eccoilopus cotulifer A. Camus in Ann. Soc. Linn. Lyon, n.s. LXX (1923) 92. Syn. *Spodiopogon cotulifer* Hack., Mon. Androp. (1889) 187.

A perennial grass. *Culms* 80-150 cm. high, erect, sub-robust, 4-6-noded, terete, striate, simple, often dark purple in colour. *Leaf-blades* strongly narrowed at the base (almost petiolate in the lower ones), linear sub-lanceolate, 15-50 cm. long by 8-12 mm. wide, finely acuminate, flat, sub-rigid, spreading, green, a few tubercle-based hairs below, scabrid above; margins very scabrid, bearded at the base; lower sheaths sub-compressed, keeled, free from the culms. upper terete, lax, striate, very smooth; ligule oblong, 2-4 mm. long, obtuse, membranous, glabrous.

Panicle oblong or ovate-oblong, 15-20 cm. long, open, shining; tip nodding; common axis terete, glabrous; branches whorled, lower 2.5-7.5 cm. long, naked at the base. lax flowered, flowering at the tips, a few villae usual at the junc-

tion with the common axis; pedicels clavate, with cupped tips, the longer equal to a spikelet in length, the shorter about $\frac{1}{3}$ the length of the spikelet. *Spikelets* linear-lanceolate, sub-fusiform, 5-6 mm. long, somewhat oblique; callus bearded with white hairs. *Lower glume* 6 mm. long, herbaceous, chartaceous, acute, minutely 2-dentate, (in long pedicelled spikelets mucronate) strongly 7-9-nerved, ciliate on the marginal nerves, the rest scaberulous, shortly awned. *Upper glume* chartaceous, lanceolate, tip minutely 2-dentate and mucronate between the teeth (especially in the longer pedicelled spikelets) obscurely carinate, convolute, 7-nerved, hairy and scabrid on the back. *Lower floret* empty; lemma 4.5 mm. long, oblong, tip rounded, scaberulous above the middle, not ciliate; palea occasionally absent, when present lanceolate, 2-toothed, ciliate. *Upper floret* hermaphrodite; lemma 4 mm. long, linear, hyaline, cleft to below the middle into 2 setiform lobes; awn slender, 12-15 mm. long; palea 4 mm. long, broadly lanceolate, 2-toothed, enervate, glabrous. *Lodicules* sub-connate; anthers 3 mm. long.

Quite common in Upper Shillong, on the banks of the river flowing from the Agricultural Farm to the Elephant Falls. Collected by C. B. Clarke at Soyung and Bogapani. Balipara Frontier Tract, 8,000 ft. On the whole a rare grass.

2. IMPERATA Cyrill.

Spikelets all alike, generally 2-nate (one short, the other long pedicelled) on the continuous branches of a spike-like, narrowly thyrsiform panicle, disarticulating from the pedicels. *Florets* 2, the lower reduced to an empty lemma. *Glumes* sub-equal, membranous, 3-4-nerved, rarely nerveless, enveloped by very long silky hairs from the obscure callus and the lower portion of both glumes. *Lemma* of the lower floret generally much smaller than the glumes, hyaline; lemma of upper floret as long, hyaline, awnless, rarely absent; palea broad, hyaline, nerveless. *Lodicules* 0. *Stamens* 1-2. *Styles* connate below; stigmas linear, exerted from the top of the floret. *Caryopsis* oblong; embryo half the length of the grain or more.

Perennial; basal-leaves crowded and like those of the innovation shoots, long; panicle silvery silky.

Imperata cylindrica (Linn.) P. Beauv., Agrost. (1812)
 165. Syn. I. arundinacea Cyrill., Pl. Rar. Neap. fasc. 2
 (1792) 26.

A perennial grass, very variable in size, some of the depauperate forms scarcely 10 cm. tall while the forms of the open plains may reach 2·5 m. or more. *Culms* solid, glabrous, fistular at the base; nodes usually densely bearded with erect white hairs. *Leaves* as variable as the culms, up to 1·5 m. long, narrowed towards the base, tapering to an acuminate tip, scabrid on the margins, covered with white villae at the base; midrib more than half the blade at the base; sheaths rather loose, glabrous or slightly pubescent, longer than the internodes, ligules membranous, ciliate, dorsally silky, erose or cleft.

Inflorescence a spike-like panicle, 3-30 cm. long, cylindric, very dense; pedicels very slender, swollen at the tips, covered with long fine hairs. *Spikelets* lanceolate, 3 mm. long, both spikelets of each pair similar; callus hairs, white, soft, 2-3 times as long as the spikelets. *Lower glume* lanceolate, membranous, firmer towards the base, hyaline at the apex, 3-9-nerved, dorsally villous; villae 2-3 times as long as the glume; upper glume keeled, as long as the lower. *Lower floret* empty; lemma, nerveless, hyaline, acute, ciliate, 1·5-2 mm. long, epaleate. *Upper floret* hermaphrodite; lemma as long, ovate-lanceolate, hyaline, nerveless, acute or denticulate, minutely ciliate or glabrous. *Anthers* 2, 2·5-3 mm. long, orange. *Stigmas* 2, long, purple.

Very common, plains to 6,000 ft. A useful thatching grass which is not relished by stock unless very young.

3. MISCANTHUS Anderss.

Spikelets 2-nate at each node, one long the other shortly pedicelled, awned or muticous, slightly dorsally compressed, articulate on the pedicels. *Glumes* 2-muticous; the lower almost flat with more or less inturned margins, often 2-4-nerved; upper glume similar but more convex, 1-3-5-nerved. *Lower floret*; lemma hyaline, empty, more or less bifid. *Upper floret* hermaphrodite; lemma hyaline, 2-toothed or bifid at the apex, awned from between the teeth, very rarely entire

or muticous; palea shorter, narrow, hyaline, nerveless, sometimes much reduced; lodicules cuneiform, glabrous, emarginate at the apex. *Stamens* 2-3. *Styles* free; stigmas rather short. *Caryopsis* shortly oblong, ventral face flattish, dorsal surface somewhat convex; embryo half as long as the caryopsis.

Tall perennial grasses. *Culms* simple, erect, striate. *Leaves* long. *Inflorescence* sub-compound, glabrous or silky in an ample panicle or corymb, made up of lengthy false spikes, simple or branchy, numerous; rhachis glabrous, tough, not articulate, carrying many spikelets; pedicels glabrous, callus often with long hairs.

Key to the species of *Miscanthus*.

Racemes many, densely crowded, 12·5-17·5 cm.

long; hairs of callus much longer than spikelet.

1. *M. nepalensis*.

Racemes few, 5-7·5 cm. long; hairs of callus

not longer than spikelet.

2. *M. nudipes*.

1. *Miscanthus nepalensis* Hack., Mon. Androp. (1889) 104.

A perennial grass with extravaginal innovations. *Culms* 60-150 cm. tall, slender, terete, puberulous below the panicle, elsewhere glabrous. *Leaf-blades* 30-50 cm. long, linear from a narrowed base, 6-10 mm. wide, flat, rigid, erect or spreading, green, very glabrous; median nerve prominent; sheaths terete, striate, often hairy below the collar, otherwise glabrous; ligule 2 mm. long, truncate, membranous.

Panicle flabelliform, 10-15 cm. long, spreading; the common axis glabrous except at the nodes, shorter than the branches. *Racemes* 8-12 cm. long, capillary, nodding, corymbose-fastigiate, fulvous haired; rhachillæ sub-capillary, scaberulous. *Pedicels* sub-capillary, erect or spreading, scarcely swollen at the tips, scaberulous, some equalling the spikelets in length, others half as long. *Spikelets* 2-2·5 mm. long, ovate-lanceolate, pale brown. *Lower glume* 2·25 mm. long, chartaceous, membranous, obtuse, apex hyaline, emarginate, hairy on the lower half of the margins with hairs of unequal length, the longer about 2-3 times the length of the glume; hairs fulvous; margins hardly inflexed; dorsum minute-

ly scaberulous. *Upper glume* 2.75 mm. long, ovate-lanceolate, acute or sub-acute; margins hyaline, 1-nerved; keel very scabrid; margins scaberulous. *Lower floret* empty; lemma 2.5-3 mm. long, broadly oblong, usually lanceolate, obtuse, often denticulate, nerveless, glabrous. *Upper floret* hermaphrodite; lemma equal to the lower lemma, linear-lanceolate, acutely 2-toothed, one-nerved, glabrous; awn very slender, 9-10 mm. long, lanceolate, acute, nerveless, glabrous. *Stamens* 2-3; stigmas exerted below the apex of the spikelet. *Caryopsis* oblong, purple-black, plano-convex or round in section, 1.5 mm. long. *Caryopsis* not always plano-convex but distinctly fusiform, oblong, ellipsoid.

Common in Assam. Especially in the Khasi Hills and also in the Naga Hills, 4,500-7,000 ft.

2. *Miscanthus nudipes* Hack., Mon. Androp. (1889) 109.

Culms sub-robust, terete, silkily pubescent below the panicle. *Leaf-blades* linear from a scarcely narrowed base, 20 cm. long or more, 4-5 mm. wide, flat, rather rigid, spreading, green, pubescent on both surfaces; margins smooth; sheaths terete; upper nodes pubescent, lower glabrous; ligule obtuse, ciliate, reddish, 2-3 mm. long.

Inflorescence made up of 8-10 racemes, fasciculate, or with a common axis, 8-10 cm. long, sub-robust, spreading, brownish, laxly grey-pilose; lower nodes 8-10 mm. distant, upper 2-4 mm.; rhachis very glabrous, triquetrous, compressed; internodes 3-4 mm. long; long pedicels 2.5-3 mm. long, short 1-1.5 mm. long, sub-clavate, very glabrous. *Spikelets* oblong, 5.5-5 mm. long, brownish, above blackish-purplish, callus bearing grey hairs $\frac{2}{3}$ the length of the spikelet. *Lower glume* 4 mm. long, chartaceous, oblong, apex hyaline, broadly truncate or divided into 2 teeth, 4-ribbed on the convex dorsum, greyish; hairs 3-3.5 mm. long. *Upper glume* 4-5 mm. long, chartaceous, lanceolate-oblong, obtuse, muticous, 5-nerved, laxly pilose on the keel above; apex sub-hyaline, ciliate. *Lower floret* empty; lemma 4 mm. long by 1.5 mm. wide, broader above, acute; apex erose, nerveless, glabrous. *Upper floret* hermaphrodite; lemma linear, broad-

ly oblong-lanceolate, obtuse, tip ciliate, 2.5 mm. long, acute, entire or toothed, 1-nerved, glabrous; awn 6-8 mm. long, erect, scabrous, brownish; palea 3.5 mm. long, linear lanceolate, acute, scabrid, nerveless. *Stamens* 2; anthers 3 mm. long. Styles elongate; stigmas linear, purple, exserted from the apex of the spikelets.

Collected by Griffith in the Mishmi country.

4. SCLEROSTACHYA A. Camus.

Spikelets in pairs, one long, the other short-pedicelled on the tough, secondary, filiform branches of an erect, terminal panicle, ovate-oblong or slightly obovate-oblong, obtuse, deciduous from the pedicels. *Short* pedicelled spikelets; glumes coriaceous, brown, shining, the lower flat on the back, with incurved margins, the upper keeled, acute, with margins ciliate above. *Florets* two; lower male or empty; lemma hyaline, ovate-oblong, ciliate at the top, paleate; upper hermaphrodite; lemma hyaline; palea long. Long pedicellate spikelets similar to the short, sometimes female.

Perennial grasses with moderately tall, fistular stems and long rigid leaves. Inflorescence a linear-oblong panicle, erect, dense.

Key to the species of *Sclerostachya*.

Panicle stout, erect; leaves long broad .. 1. *S. fusca*.
Panicle slender, drooping; leaves short, narrow. 2. *S. milroyi*.

1. *Sclerostachya fusca* A. Camus in Lecomte, Flor. Gen. de l'Indo-Chine, VII (1922) 243. Syn. *Saccharum fuscum* Roxb., Flor. Ind. I (1832) 236.

Culms from 1.5 to 3 m. tall, robust, reed-like, fistular, appressed-pubescent near the top. *Leaf-blades* with a contracted base, sub-lanceolate, linear, setaceous-acuminate, 1 m. long or more, 2-4 cm. wide, flat, rigid; base erect, glabrous on both surfaces; margins very scabrid, median nerve prominent as a white line above; primary nerves 7-9; sheaths longer than the internodes; margins ciliate; ligules rounded, 3 mm. long, brown, membranous, ciliate.

Inflorescence a linear-oblong panicle, straight, dense, 30-60 cm. long; common axis angular, pubescent, bearded at the nodes; primary branches often solitary, carrying at the base secondary branches which are alternate, fasciculate, long, simple or branching at the base, filiform, pubescent; racemes of spikelets 6-10 cm. long, slender, sessile, erect, spreading, nodding at the summit, somewhat glabrous; rhachis articulate but tough, filiform, rather flexuous. *Spikelets* ovate-oblong, or obovate, 3 mm. long, 1.5 mm. broad, brown, 2-nate, one shortly pedicelled the other with a long pedicel, falling finally from the pedicels; callus short with grey hairs which are almost half as long as the spikelet. *Lower glume* 3 mm. long, sub-coriaceous, shining, obtuse, entire, with margins narrowly inflexed; folds ciliate; back flat or slightly depressed above the middle, very glabrous, obscurely 2-3-nerved. *Upper glume* acute, keeled, glabrous, margins ciliate above, 1-nerved. *Lower floret* male or empty; lemma about 3 mm. long, ovate-oblong, obtuse, nerveless, stiff ciliate at the apex. *Upper floret* hermaphrodite; lemma 2.5 mm. long, similar to lower lemma; margins long and rigidly ciliate; palea much smaller, ovate, ciliate; lodicules glabrous; anthers 1.5 mm. long.

Very common in Lakhimpur and Sibsagar.

2. *Sclerostachya milroyi* Bor, Ind. For. Rec. (Bot.)

1. 3. (1938) 85.

Culms up to 1.5 m. tall, slender, appressed pubescent below the panicle. *Leaf-blades* linear-lanceolate, tapering to a fine setaceous point from a contracted base, up to 35 cm. long, 8 mm. broad, glabrous, somewhat rough on both surfaces; margin thickened and scabrid; median nerve very prominent, broad, white; primary nerves four; sheaths longer than the internodes, smooth, hirsute near the auricled mouth, otherwise glabrous, ciliate on the margins; ligule obtuse, almost triangular, 2 mm. long, smooth inside, brown, densely hirsute on the back and ciliate on the margins.

Inflorescence a weak, lax, linear, oblong panicle, spreading and loose or contracted and dense, 15-20 cm. long, 5-12 cm. broad. *Primary axis* pubescent, smooth, rounded or

angular, shallowly channelled, bearded at the nodes. *Primary* branches fascicled at the nodes, frequently branched; secondary branches fascicled at the pubescent nodes, spreading, pubescent, filiform. *Racemes* of spikelets up to 16 cm. long, closely spiculate. *Spikelets* in pairs, narrowly elliptic, ovate-oblong, obovate or oblong, acute, 3-4 mm. long, both pedicelled, articulate on the pedicels; pedicels 1-2.5 mm. long, angled, smooth and glabrous, expanded into a cup at the apex. *Callus* with white hairs up to 1.5 mm. long. *Lower glume*; shape of the spikelet, 2-nerved, smooth and glabrous on the back between the nerves, long villous between the nerves and the margin, membranous or sub-coriaceous, back flat or slightly depressed above the middle, margins inflexed, ciliate. *Upper glume* acute, 3.5 mm. long; back keeled or rounded, very smooth and glabrous, ciliate on the margins above, 1-nerved. *Lower floret* barren; lemma hyaline, ovate-acute, 3 mm. long, ciliate at the apex, faintly 5-7-nerved, epaleate. *Upper floret* hermaphrodite; lemma ovate-lanceolate, up to 3 mm. long, ciliate at the apex, hyaline, faintly 5-nerved; palea usually absent, if present, minute. *Stamens* 3; anthers 1.5 mm. long. *Stigmas* feathery, exserted at anthesis. *Lodicules* 2, cuneate, truncate, upper margin bluntly toothed.

Sibsagar. Assam.

5. NARENGA Bor.

Narenga Bor.; genus novum graminearum distinctum, a *Saccharo* Linn. glumis inferioribus prorsus coriaceis, glumis superioribus (apice membranceo excepto) etiam coriaceis, distinguendum.

Spiculæ omnes similes, binae, una sessilis, altera pedicellata, rhachi articulata racemorum paniculorum dispositæ; pedicellatæ a pedicello solutæ, sessiles cum rhacheos articulo acumbente pedicelloque demum decidentes. *Anthæcia* 2, inferius ad lemma reductum, superius hermaphroditum. *Glumæ* æquales, coriaceæ vel secundaria apice membranacea; inferior dorsi plana, marginibus involutis, breviter ciliatis; superior carinata, apice membranacea. *Lemmata* hyalina;

superius truncatum, paleatum, sine arista. *Lodiculae* 2. *Stamina* 3, lateraliter exserta.

Gramina perennia, alta, foliis planis, scabris. *Culmi* nodis dense barbati. Panícula angusta, densa; pili spiculis breviores.

NARENGA * Bor.

Spikelets all alike, 2-nate, one sessile the other pedicelled on the articulate fragile rhachis of panicked racemes, the pedicelled falling from their pedicels, the sessile together with the contiguous joint of the rhachis and pedicel. *Florets* 2; the lower reduced to an empty lemma; upper hermaphrodite. *Glumes* equal in length, coriaceous, brown, shining; lower flat on the back, margins laxly inflexed, short haired on the margins; upper keeled, membranous at the top. *Lemmas* hyaline; upper truncate, awnless paleate. *Lodicules* 2. *Stamens* 3. *Stigmas* laterally exserted.

Tall perennial grasses with long flat scabrid leaves. *Culms* densely bearded at the nodes. Panicle narrow dense; hairs shorter than the spikelets.

Narenga porphyrocoma* (Hance) Bor comb. nov. Syn. *Saccharum narenga* Wall Cat. no. 8856; *Eriochrysis narenga* Nees ex Steud., Syn. Pl. Glum. (1854) 411; *Eriochrysis porphyrocoma* H. F. Hance, Jour. Bot. XIV (1876) 294; *Saccharum porphyrocomum* (Hance) Hack., Mon. Androp. (1889) 120.

Culms 2-2.5 m. tall, erect, somewhat slender, rounded, appressed silky below the panicle and on the nodes. *Leaf-blades* narrow at the base, flat, glabrous above, with tubercle based hairs below and very scabrid, 30-60 cm. long by 6 mm. broad, the upper reduced and subulate; median nerve strong; margins very scabrid; sheaths often little shorter than the internodes, tubercular, scabrous with long hairs near the throat and on the margins or hairy all over; ligules rounded, ciliate, 2-3 mm. long.

Inflorescence a narrow dense panicle, almost linear, erect, woolly, purplish or whitish, 30-45 cm. long; common axis robust, glabrous, minutely scaberulous, bearded at the nodes;

* Published in Ind. For. LXVI (1940) 267.

primary branches 2-4-nate, filiform, appressed, often simple at the base, glabrous, secondary branches alternate; internodes of the rhachis fragile, about $1/3$ shorter than the spikelet and equalling the pedicel, linear, clavate, hairy at the base; margins ciliolate at the base, glabrous at the summit. *Sessile spikelets* oblong, brown, 2.5-3 mm. long; callus small with abundant rigid hairs. *Glumes* coriaceous; lower 2.5-3 mm. entire, margins narrowly and laxly inflexed at the summit, short haired on the margins, back flat; the upper 2.5-3 mm. long, membranous at the summit, broadly oblong, keeled, obtuse, margins ciliate towards the top, obscurely 3-nerved. *Lower floret* empty; lemma 2.5-3 mm. long, oblong, obtuse, ciliate, nerveless. *Upper floret* hermaphrodite; lemma; 2-3 mm. long, linear-oblong, obtuse or truncate, emarginate, nerveless, ciliate; palea about as long as the ovary; lodicules glabrous; anthers 1.5 mm. long. *Styles* as long as the linear oblong stigmas, blackish purple, 1 mm. long.

It has long been felt by agrostologists that the retention of *Saccharum narenga* Wall. in the genus *Saccharum* was anomalous owing to its possession of morphological characters which are quite distinct from those of species accepted as members of that genus. The most important of these is the coriaceous glumes (slightly membranous at the tip in the case of the upper glume) in contrast to the membranous glumes, at most slightly coriaceous at the base, of the other species.

The late Dr. Otto Stapf treated *S. narenga* as a distinct genus in the Kew Herbarium. Dr. G. Bremer (Proceedings of the Third Congress of the International Society of Sugarcane Technologists, (1930) 408) remarks: "It must be stated, however, that *Saccharum narenga* has only 15 chromosomes in the haploid phase. According to Professor Jeswiet it is uncertain whether this species is indeed a *Saccharum*, since it is a grass with external characters that differ in a certain degree from those of *Saccharum*." I. H. Burkill (Economic Products of the Malay Peninsula, II (1935) 1923), states under *Saccharum* "It must be explained that the delimitation of *Saccharum* from the most closely allied genera has undergone changes recently by which, in the first place, the genus, as it stood in the Flora of British India in 1897, has been divided into three genera: (1) *Saccharum*, which includes *S. spontaneum* Linn. and *S. arundinaceum* [Retz.; (2) *Narenga*, into which *S. narenga*, Buch-Ham. has been transferred and (3) *Sclerostachya* with *S. fuscum* Roxb. and *S. ridleyi* Hack." I have been unable to find any reference in the

literature to the creation of a genus to include *S. narenga* and Mr. C. E. Hubbard of Kew has not been able to throw any light upon this question.

As *Narenga* cannot be used for the specific epithet the next available is "*porphyrocoma*" since *Eriochrysis porphyrocoma* Hance is a synonym of *Saccharum narenga* Wall. Hackel kept *Saccharum porphyrocomum* (Hance) Hack. (*Eriochrysis porphyrocoma* Hance) distinct in his monograph on the *Andropogoneæ* but he did not see Hance's specimens and only copied his description.

Dr. E. K. Janaki Ammal has been good enough to place at my disposal the result of her researches into the cytology of *Saccharum* and closely allied genera.

<i>Saccharum arundinaceum</i>	2n = 40.
<i>S. officinarum</i>	2n = 80.
<i>Sclerostachya fusca</i>	2n = 48 and 96.
<i>Imperata cylindrica</i>	2n = 20.
<i>Narenga porphyrocoma</i>	2n = 30.

Saccharum spontaneum (E. J. Janaki Ammal, Ind. Jour. Agric. Sc. VI (1936) 1), in so far as its Indian forms are concerned, has been shown to form a polyploid series with the following chromosome numbers 2n = 48, 56, 64, 80.

6. SACCHARUM Linn.

Inflorescence a silky, often a silvery-silky panicle. *Spikelets* all alike, surrounded by hairs, one sessile the other pedicelled on the articulate fragile rhachis of panicle racemes; the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rhachis and pedicel. *Florets* 2; the lower reduced to an empty lemma; upper hermaphrodite. *Glumes* equal, often chartaceous to sub-coriaceous at the base, membranous to sub-hyaline upwards; lower with inflexed margins in the sessile spikelet, usually with an even number of nerves; upper 1-3-5-nerved. *Lemmas* hyaline; upper with a terminal, bristle-like, usually straight awn, or mucronate; lodicules 2, cuneate. *Stamens* 3. *Stigmas* laterally exserted. *Caryopsis* oblong to sub-globose; embryo short to half the length of the grain or more.

Perennial herbs, robust, tall to very tall, usually in damp places. *Culms* erect, round. *Leaves* narrow, flat, often rolled when dry.

Key to the species of *Saccharum*.

- Stem silky below the panicle. 1. *S. spontaneum*.
 Stem glabrous below the panicle :—
 Lower glume dorsally villous.
 Joints 3·5-4 mm. long; pedicels 2-2·5 mm.
 long; sessile spikelets 2·5-2·7 mm. long. 2. *S. arundinaceum*.
 Joints 6-7 mm. long; pedicels 2·5-3·5 mm.
 long; sessile spikelets 3-4 mm. long. .. 3. *S. procerum*.
 Lower glume glabrous. 4. *S. officinarum*.

**1. *Saccharum spontaneum* Linn., Mant. II (1771)
 183.**

Rhizome thick. *Culms* 1-4 m. erect, with several nodes, solid, smooth, polished, glabrous, with silky appressed hairs below the panicle, densely waxy below the nodes, slender. *Leaf-blades* erect, rigid, coriaceous, glaucous, narrowly linear-acuminate, capillary at the tip, very glabrous except sometimes at the base, smooth at least below; margins scabrid, often involute, 45-170 cm. long, 4-5 mm. broad at the most, the upper scarcely shorter; sheaths auricled, glabrous, except sometimes towards the throat and on the margins, often blotched reddish-black inside; ligule ovate, membranous.

Inflorescence a lanceolate shaped panicle, dense, somewhat contracted, slender; common axis slender, fragile, silky, almost glabrous except for appressed hairs at the summit; primary branches slender, 5-10 cm. long, the lower 4-5-nate, the upper 1-2-nate; secondary branches from the base, simple or branched, filiform, silkily-hairy, the upper spiculate to the base, the lower naked; pedicels ciliate, somewhat like the internodes of the rhachis, 1·5-3 mm. long. *Spikelets* 3-6 mm. long, lanceolate, base often sub-glabrous, muticous, the pedicelled often more acute than the sessile; callus small, with silky hairs twice to several times the length of the spikelet. *Lower glume* 3-6 mm. long, lanceolate-acuminate or subulate, membranous, hyaline, but sub-indurated and coriaceous at the base, entire or 2-toothed, margins smooth or ciliate, narrowly inturned, glabrous on the back, 2-nerved; upper glume equalling the lower, almost of the same texture, oblong-ovate or broadly lanceolate, acuminate, often mucronate, keel and margins ciliate, 1-nerved. *Lower floret* empty; lemma 3-6 mm. long, ovate-lanceolate, acute or somewhat obtuse,

ciliate, nerveless. *Upper floret* hermaphrodite; lemma variable, often reduced, nerveless, ciliate or not; palea small about the size of the lodicules, ovate, ciliate, lodicules ciliate on the margins, often with one long hair. *Stamens* linear, 1.5-2 mm. long. *Stigmas* oblong, longer than the style.

A good fodder for buffaloes; leaves used for thatching. A very common grass in Assam being found in plains and hills. This is a very variable grass and an investigation by Dr. Janaki Ammal has shown that the Indian forms are a polyploid series with chromosome numbers ($2n$) varying from 48 to 80 (vide Ind. Jour. Agri. Res. VI (1936) 1).

2. *Saccharum arundinaceum* Retz., Obs. IV (1786) 14.

A very large grass growing in clumps. *Culms* up to 6 m. tall, glabrous, smooth; internodes long; nodes smooth and glabrous. *Leaf-blades* up to 1.5 m. long, 5 cm. wide, with a midrib at the base up to $\frac{1}{3}$ the width of the blade, lanceolate-linear tapering to a very fine point, villous at the base only for a short distance on the midrib; margins very scabrid; upper leaves much reduced and often filiform; sheaths glabrous, striate, stout; ligule a truncate membrane.

Inflorescence a large silky panicle up to 60 cm. long, pink-white or silvery; axis glabrous; branches tufted, alternate or sub-verticillate. *Sessile spikelets* 2.5-2.7 mm. long; pedicels 2.2-2.5 mm. long; joints of the rhachis 3.5-4 mm. long. *Callus* furnished with hairs as long as the spikelet. *Sessile* spikelet; *lower glume* chartaceous with a few villæ on the back which overtop the spikelet. *Upper glume* glabrous. *Lower floret* male or neuter; lemma hyaline, as long as the spikelet, epaleate. *Upper floret* hermaphrodite; lemma hyaline, half the length of the spikelet, contracted into a short mucro which is not exerted; palea quadrangular, small, half as long as the lemma, ciliate. *Pedicelled* spikelet; glumes dorsally villous. *Flowers* at the end of the rains.

According to Parker, Ind. For. LVI (1930) 341. *S. arundinaceum* Retz. only occurs as a cultivated plant. It seems to be wild in Assam.

3. *Saccharum procerum* Roxb., Fl. Ind. I (1832) 243.

A very tall grass. *Culms* up to 4.5 m. solid, terete, glabrous and smooth. *Leaf-blades* up to 1.5 m. long, 5 cm. wide, linear-lanceolate, tapering to a fine point, very scabrid on the margins; midrib occupying more than $\frac{1}{2}$ the width of the blade at the base and covered with dense villæ from the ligule 10 cm. up the blade; sheaths glabrous; ligule membranous.

Inflorescence a large silvery or grey, rather loose panicle. *Axis* smooth and glabrous; rhachis-joints 6-7 mm. long; pedicels 2.5-3.5 mm. long. *Sessile* spikelets 3-4 mm. long. For the rest as in *S. arundinaceum* Retz.

In Ind. Forester LVI (1930) 340, R. N. Parker points out that *S. procerum* Roxb. is the wild plant of Assam, Bengal and Burma. This grass flowers in January by which time the inflorescences of *S. arundinaceum* are mature. Owing to the longer joints and pedicels the panicles of *S. procerum* Roxb. are much looser than those of *S. arundinaceum*.

S. procerum Roxb. is very common in Assam and is found in wet low-lying places in the plains and also in the hills up to an altitude of 3,000 ft. This species is probably the same as *Saccharum bengalense* of Retzius. Obs. V. (1789), 16. If so, this name should take precedence.

4. *Saccharum officinarum* Linn., Sp. Pl. (1753) 54.

Culms 2-6 m. tall, erect, glabrous or with appressed hairs below the panicle, waxy at least below the nodes, simple or branched. *Leaf-blades* rigid, linear-lanceolate, acuminate, base narrower, spreading, drooping at the tip, rather glaucous on the lower surface, scabrous, particularly above and on the margins, 1.5 m. long by 6 cm. broad, the upper scarcely shorter; median nerve thick, white above; sheaths pubescent towards the throat or at first covered with appressed hairs; ligule very short, membranous, ciliate.

Inflorescence a very large panicle, ovate-pyramidal, spreading, dense; principal axis glabrous, nodes bearded, smooth, rarely with appressed pubescence, channelled; pri-

mary branches slender, 5-10 cm. long, more or less verticillate, filiform, pubescent at the base, glabrous; minutely scaberulous at the top, bearded towards the nodes, base shortly naked; secondary branches simple, distant; internodes fragile, equalling and exceeding the spikelet in length, somewhat thickened at the top, very glabrous between the angles; pedicels glabrous. *Spikelets* linear-oblong, pale or almost brownish, muticous, 3.5-4 mm. long, surrounded by dense white silky hairs 1.5-2 mm. long; callus covered with dense white silky hairs 7-12 mm. long. *Lower glume*: 3.5-4 mm. long, papyraceous-membranous, acute, entire; margins broadly but laxly inserted, very obscurely nerved or nerveless. *Upper glume* 3.5-4 mm. long, membranous, lanceolate, acute, 1-3-nerved, keels scabrous above, glabrous or ciliate. *Lower floret* empty; lemma almost as long as the spikelet, lanceolate, acute, hyaline, membranous, nerveless. *Upper floret* hermaphrodite; lemma very reduced or absent; palea lanceolate, rather acute, ciliate at the apex.

Cultivated in both valleys.

7. ERIANTHUS Michx.

Spikelets all alike, 2-nate, one sessile the other pedicelled, on the articulate and usually fragile rhachis of paniced racemes, the pedicelled falling from their pedicels, the sessile deciduous with the contiguous joint of the rhachis and the pedicel. *Florets* 2; the lower reduced to an empty lemma; the upper always hermaphrodite. *Glumes* equal, membranous to coriaceous; lower dorsally flattened, more or less distinctly 2-keeled, with inflexed margins and a variable number of intracarinial nerves, upper 1-3-nerved, keeled. *Lemmas* hyaline, lower muticous or mucronate, upper awned; palea small, hyaline, nerveless. *Lodicules* 2, cuneate. *Stamens* 2-3. *Stigmas* usually laterally exerted. *Grain* oblong to linear-oblong.

Perennial, erect, often gigantic grasses. *Blades* long, narrow, midrib very stout; ligules membranous. *Panicle* much branched, often large, silky and showy; spikelets usually villous, with an involucre of hairs from the base.

Key to the species of *Erianthus*.

Upper lemma entire, narrowed into the awn :—

Culms glabrous below the panicle. .. 1. *E. elephantinus*.

Culms silkily-villous below the panicle. .. 2. *E. fulvus*.

Upper lemma 2-toothed or 2-lobed :—

Lower glume dorsally glabrous. .. 3. *E. longisetosus*.

Lower glume dorsally villous :—

Spikelets 3·5 mm. long; lower glume dorsally villous all over. .. 4. *E. chrysothrix*.

Spikelets 5·6 mm. long; lower glume villous below the middle. .. 5. *E. hookeri*.

1. *Erianthus elephantinus* Hook. f., F. B. I. VII (1897) 122.

Culms very tall, up to 4 m., robust, stout, smooth and glabrous. *Leaf-blades* up to 1·5 m. long, 5 cm. broad, smooth on both surfaces; median nerve very prominent; margins cartilaginous and roughly scabrid; sheaths up to 1 m. long, smooth and glabrous; ligule a fringe of long straight hairs.

Panicle up to 40 cm. long; rhachis glabrous, polished; lower nodes 10 cm. apart; branches numerous, lower fascicled and half whorled, 15-20 cm. long; rhachis few flowered, capillary, fragile; joints and pedicels half as long as the spikelets or longer, villously-ciliate, hairs 2·5-4 mm. long, grey or purplish, top cupular. *Spikelets* ovate-lanceolate, pale, 3·5-4 mm. long; callus bearded. *Lower glume* 3-5-nerved, narrowly ovate-lanceolate, tip 2-toothed, dorsally flat and sparsely hairy; keels scabrid; *upper glume* lanceolate, acuminate, sub-aristate, 3·5-4 mm. long, 1-nerved. *Lower floret* empty; lemma 3·5 mm. long, stiff, hyaline, 1-nerved, ciliate; margins recurved. *Upper floret* hermaphrodite; lemma 2·5 mm. long, quite glabrous, awn 2·5 mm.; palea as long as the lemma or sometimes absent.

A gigantic and gregarious grass found in the plains of Assam.

2. *Erianthus fulvus* Nees ex Steud., Syn. Pl. Glum. (1854) 409.

Culms 1-2 m. high, robust, many noded, with silky appressed hairs below the panicle. *Leaf-blades* linear from

a slightly narrowed base, setaceous-acuminate, 30-70 cm. long, 8-16 mm. broad, flat, rigid, glabrous except at the base, glaucous, scabrous below, smooth, green above; margins scabrid; median nerve prominent; sheaths striate, glabrous except towards the collar where the pubescence is silkily appressed, nodes sometimes bearded; ligule rotund-truncate, 1-2 mm. long, fuscous, membranous, long-ciliate.

Panicle erect, short, oblong, 20-25 cm. long, very dense at first, mauve-purple, fading to a fulvous colour, compound; common axis villous; primary branches solitary, up to 7 cm. long, spikelets crowded; joints 8 to 10; pedicels filiform, villous, half as long as the spikelets or more. *Sessile spikelets* 2.5-3 mm. long, lanceolate, brownish; *callus hairs* 1 cm. long, pale towards the top; *lower glume* chartaceous, membranous, the hyaline tip abruptly acuminate, entire; margins inflexed below the apex or not; back flat, very glabrous, 2-nerved, 2.5 mm. long; *upper glume* rather longer, 2.5-3 mm. long, acute or 2-mucronulate, glabrous; margins ciliate. *Lower floret* empty; lemma 3 mm. long, linear-lanceolate, acute, ciliate; palea absent. *Upper floret* hermaphrodite; lemma 2 mm. long, ovate-lanceolate, glabrous, 1-nerved; awn 6-8 mm. long; palea as long as the glume or shorter (.5 mm.) or entirely absent. Pedicelled spikelet similar to the sessile but lower glume sometimes with spinose hairs. *Caryopsis* obovate, ellipsoid brown to golden in colour, 1.5 mm. long.

Common in the Khasi and Naga Hills, 4-6 000 ft.

3. *Erianthus longisetosus* Anderss. ex Benth. in Journ. Linn. Soc. XIX (1881) 67.

Culms 2-2.5 m. tall, stout, solid, terete, reed-like, simple or branched from a stout rhizome, almost woody below, smooth and glabrous, naked below the panicle. *Leaf-blades* 30-100 cm. long, flat, up to 1.5 cm. wide, lanceolate, tapering to a fine tip from a gradually narrowed base, smooth and glabrous on both surfaces or with short appressed hairs; margins very scabrid; sheaths rather loose, strongly striate, covered with appressed tubercle-based hairs; margins hyaline,

smooth and glabrous, hairy at the junction with the blade: ligule rounded and shortly ciliate.

Panicle 15-45 cm. long, made up of many, long, densely packed, solitary or binate, long divided, soft, drooping racemes clothed with pale, reddish or golden brown hairs, spreading at anthesis; rhachis nodes bearded or glabrous; joints and pedicels slender, about as long as the spikelets, densely ciliate with long hairs of unequal length, 3-8 mm. long; pedicels slightly thickened upwards, cupped. *Spikelets* 4.5-5 mm. long, oblong-lanceolate in shape, golden brown in colour, bearded on the callus, (hairs 8 mm. long), disarticulating from the pedicels, rather pale at the tips. *Pedicelled spikelets* with long hairs from the lower portion of the dorsal surface of the glumes; the glumes of the sessile spikelets are usually glabrous. *Lower glume* oblong-lanceolate; margins closely appressed and rather membranous, the rest of the glume being chartaceous, 4.5-5 mm. long, glabrous, 2-4-6-nerved; nerves often anastomosing; apex truncate or sub-two-toothed; upper glume oblong-lanceolate, 1-nerved; apex and margins hyaline, ciliate, glabrous; apex apiculate or rarely very shortly awned. *Lower floret* empty; lemma oblong, hyaline, ciliate. *Upper floret* hermaphrodite; lemma very variable, about 3.5 mm. long, very narrow; awn up to 2 cm. long; palea small, hyaline, oblong, truncate.

Common in the hills but is also found in the foot-hills.

4. *Erianthus chrysothrix* Hack. in Oestr. Bot. Zeitschr. XLI (1891) 6.

Culms 1-1.5 m. tall, solid, smooth, rusty tomentose below the large panicle. *Leaves* narrowed at the base, linear, 40-80 cm. long, 1-1.5 cm. wide, tapering to a very fine point, rigid, green; tip bending over, glabrous or sparsely hirsute; margin very scabrid; margins of the sheaths covered with dense, hirsute, rusty coloured hairs, rest glabrous and smooth save the upper which are covered with appressed hairs; ligule short, membranous, with short dense hairs behind.

Panicle linear oblong, 30-40 cm. long, erect, contracted, densely flowered, covered with a very dense golden brown or rusty tomentum; nodes of the rhachis reddish-bearded and

ciliate; branches sub-verticillate, shortly branched at the base, the primary shortly naked at the base, the secondary spiculate to the base. *Racemes* sub-erect, slender, usually 8-10 cm. long, dense flowered; pedicels and internodes about equal to the spikelets in length or shorter, sub-clavate at the tips; ferruginous hairs increasing in length from the base to the tip but even then not exceeding the spikelet in length. *Sessile spikelets* 4-5 mm. long, linear-oblong, brownish, ferruginous pubescent; lower glume chartaceous, narrowly truncate, 2-nerved, back flat, covered with short hairs, those on the margins the longer; upper truncate, 3-nerved, keeled, lower floret empty; lemma 2.5 mm. long, lanceolate, ciliate above; upper floret hermaphrodite; lemma 2 mm. long, linear-oblong, cleft at the apex, from which issues an awn 3-7 mm. long (awn often absent) rarely muticous; palea .5-1 mm. square, ciliate; anthers 2 mm. long.

Exceedingly common in the Khasi Hills, 3-4,000 ft. A gigantic specimen collected in Darrang in October 1937 was over 4.5 m. tall, with leaves up to 200 cm. long by 4 cm. wide.

5. *Erianthus hookeri* Hack., Mon. Androp. (1889)
142.

A perennial grass up to 2 m. tall. *Culms* stout, smooth and glabrous, villous below the panicle. *Leaves* rather flaccid, 30-50 cm. long, up to 2.5 cm. wide, median nerve strongly marked, white, smooth and glabrous on both surfaces or a few hairs at and above the insertion of the sheath, margins very rough; sheaths closely fitting, smooth and glabrous, villous at the top; ligules membranous, rounded, ciliate.

Inflorescence a silky panicle made up of silky racemes of spikelets; spikelets in pairs, one sessile the other pedicelled. Main axis of the inflorescence pubescent, pedicels and joints of the rhachis 3-4 mm. long, ciliate on the angles, callus long bearded. *Sessile spikelets* 5-5.5 mm. long, oblong, oblong-lanceolate in shape; lower glume chartaceous, 2-toothed at the apex, dorsally flat, 2-keeled, keels scabrid, villous with long hairs below the middle, 1-2-nerved between the keels, nerves often anastomosing; upper glume oblong,

chartaceous, 3-nerved, sparsely villous on the back, keeled, keel scabrid above the middle, margins broadly inflexed above, ciliate. *Lower floret* empty; lemma lanceolate, nerveless, ciliate, 4-4.25 mm. long, epaleate. *Upper floret* hermaphrodite; lemma 4 mm. long, oblong, hyaline, 2-lobed, margins ciliate, awned in the sinus; awn up to 2.5 cm. long, scaberulous, filiform; palea short, oblong, obtuse, hyaline, 1.75 mm. long. *Stamens* 3, anthers 2-2.5 mm. long.

Found in Therria forest on the Sylhet side of the Khasi Hills, 2,000 ft.

8. MICROSTEGIUM Nees.

Spikelets 2-nate, one sessile one pedicelled or both pedicelled, in fragile (easily disarticulating) sub-digitate or fascicled racemes, rarely villous. *Glumes* sub-equal, lower membranous or coriaceous, dorsally deeply channelled or concave, truncate or narrowly truncate or 2-toothed with margins narrowly inflexed throughout their length; the upper usually laterally compressed, keeled, acute. *Lower floret* empty or male; lemma hyaline or absent, ciliate, paleate or not, (when the lemma is absent the palea may be as long as the lower glume, male or neuter). *Upper floret* hermaphrodite; lemma usually very short, hyaline, entire, 2-fid or 2-auricled or reduced to the dilated base of the long awn; palea small or absent. *Lodicules* obliquely truncate. *Stamens* 3, rarely 2. *Caryopsis* firm.

Annuals or perennials, often decumbent below. *Leaves* conspicuously contracted at the base or petioled.

Key to the species of *Microstegium*.

Upper lemma well developed $\frac{1}{2}$ - $\frac{2}{3}$ length of upper glume; lobes long, acute; ligules 6-9 mm. long. 1. *M. petiolare*.

Upper lemma very small, shortly 2-lobed :—

 Anthers 3 :—

 Anthers long, up to 1.5-3 mm. long :—

 Lower floret absent; spikelets 2-2.5 mm.

 long. 2. *M. monanthum*.

 Lower floret present, male or neuter :—

 Hairs on the angle of the rhachis joints

 a little shorter than the joints: callus

with dense hairs about $\frac{1}{2}$ the length of the spikelet; spikelets 3.5-4 mm. long, nodes pubescent.

3. *M. gratum*.

Hairs on the angle of the rhachis $\frac{1}{2}$ - $\frac{3}{4}$ the length of the joint, sometimes absent at the top; callus hairs, short and sparse; spikelets 2.5-3.5 mm. long.

4. *M. ciliatum*.

Anthers very small, spikelets 4.5-6 mm. long.

5. *M. vimineum*.

Anthers 2; spikelets 3-4 mm. long; racemes rather distant, finally spreading; awn up to 15 mm.

6. *M. nudum*.

1. *Microstegium petiolare* (Hack.) Bor, Ind. For. Rec. 1, 3 (Botany) 1938, 87. Syn. *Ischæmum petiolare* Hack., Mon. Androp. (1889) 238.

Culms 60 cm.-1 m. tall, stout, scrambling, rooting from the lower nodes, robust, terete, glabrous, simple or branched, pubescent below the panicle; nodes pubescent. *Leaf-blades* 20-30 cm. long, 2-2.5 mm. broad, rigid, spreading, lanceolate, setaceous-acuminate, both surfaces with appressed tubercle-based hairs; margins scabrid; sheaths terete, back and sides glabrous, rarely hairy; margins ciliate; ligules linear-oblong, 4-9 mm. long, truncate, fulvous in the middle, back often pubescent, decurrent into margins of sheaths.

Inflorescence of 8-20 racemes, forming an oblong-panicle, 6-10 cm. long, simple or divided; axis glabrous; axils bearded; joints and pedicels sub-trigonal, about as long as the spikelets, shortly ciliate. *Sessile spikelets* 4.5-5 mm. long, lanceolate-oblong; callus minutely or sparsely bearded; lower glume dorsally deeply channelled, chartaceous, 2 toothed; margins broadly inflexed from base to tip, 6-8-nerved; keels scabridly ciliate; upper glume chartaceous, keel scabrid, 3-nerved. *Lower floret* male; lemma 4.5-6 mm. long, oblong, membranous-hyaline, 3-nerved, the hyaline margins inflexed above and ciliate; palea equally long, hyaline acute; anthers 3 mm. long. *Upper floret* hermaphrodite; lemma 3-4.5 mm. long, ovate-oblong, membranous, hyaline, divided into 2-lobes to below the middle, lobes acute, glabrous, 3-nerved below, awned from the sinus; awn

4-8 mm. long; palea as long as the lemma, linear-lanceolate, acute, hyaline, nerveless, glabrous. *Pedicelled spikelets* rather shorter than the sessile, for the rest similar, except that the lower glume is not so deeply channelled.

Very common in the pine forests, Upper Shillong, where it grows in deep shade at 4-5,000 ft.

2. *Microstegium monanthum* A. Camus in Lecomte, Flor. Gen. de l'Indo-chine VII. 257. Syn. *Pollinia monantha* Nees apud Steud., Syn. Pl. Glum. (1854) 410.

An annual. *Culms* 30-90 cm. tall, decumbent at the base, afterwards erect, slender, multinoded, shortly exserted, puberulous below the inflorescence. Leaf-blades linear-lanceolate, base contracted, acuminate at the tip, flat, spreading, green, soft, 7.5-15 cm. long, 6-14 mm. broad, hairs appressed, at least below; margins very scabrid; sheaths sub-compressed, shorter than the internodes, puberulous or glabrous and hairy towards the throat; ligules short.

Inflorescence of 3-6 racemes, flexuous, 4-6 cm. long, hairy; joints of rhachis 2-2.4 mm. long, linear, compressed, sub-clavate, very slender, pale yellow or yellowish-brown, the angles furnished with fine hairs .5 mm. long; pedicel 1.8-2.2 mm. long, compressed, ciliate. *Sessile spikelets* oblong, 2-2.5 mm. long; callus shortly bearded; glumes spreading; lower 1.8-2.2 mm. long, oblong, obtuse, entire, sub-acute or narrowly truncate, channelled and scaberulous on the back, 2-keeled; keels scaberulous, or shortly ciliate at the tip; upper glume 2-2.5 mm. long, papyraceous, membranous, oblong-lanceolate, truncate, almost obtuse, mucronate or aristate, compressed laterally, navicular; keels scabrid above; margins white, scarious, velvety towards the apex, strongly 5-nerved. *Lower floret* absent. *Upper floret* hermaphrodite; lemma minute, 2 mm. long, rounded, 2-toothed; awn 5-6 mm. long, perfect, column glabrous, slightly exserted; palea very small, ovate, obtuse, nerveless, glabrous. *Stamens* 3; anthers linear, 1.5 mm. long. *Caryopsis* rounded. *Pedicelled spikelets* similar to the sessile but longer, ciliate.

KHASI and JAINTIA HILLS, NAGA HILLS. 4-5,000 ft.

3. *Microstegium gratum* *A. Camus* in Lecomte Flor. Gen. de l' Indo-Chine VII. 258. Syn. *Pollinia grata* Hack., Mon. Androp. (1889) 175.

Culms 80 cm.-1.5 m. slender, decumbent at the base, pubescent or scaberulous below the nodes. *Leaves* linear-lanceolate, acuminate, setaceous, tapering to the base, 10-20 cm. long by 8-20 mm. broad, rigid, scabrid on both surfaces; median nerve somewhat prominent; sheaths smooth and glabrous or with sparse tubercle-based hairs towards the base; ligules short, membranous, glabrous.

The *inflorescence* is a panicle made up of 6-12 racemes, slender, 6-10 cm. long, dense, greenish or purplish, shortly distant on the common axis, simple or rarely divided, spreading; rhachis of the racemes fragile, straight or slightly flexuous; joints 2.4-2.7 mm. long, linear, dilated at the top, sub-clavate, with hairs 2-2.5 mm. long; pedicels similar to the joint of the rhachis but shorter. *Spikelets* oblong, 3.5-4 mm. long; callus small, hairy, hairs about $\frac{1}{2}$ the length of the spikelet; lower glume papyraceous, ovate-oblong, obtuse, 2-toothed, flattened dorsally or obscurely channelled, glabrous save on the margins, 4-nerved, the intramarginal nerves interrupted towards the summit, rigid hairy on the upper part of the keels; upper glume 3.5-4 mm. long, membranous with hyaline margins, ovate-obtuse, sometimes mucronate, 3-5-nerved; the median above prominent; keel ciliate. *Lower floret* male or neuter; lemma 1.1-3 mm. long, hyaline, ovate-obtuse, nerveless. *Upper floret* hermaphrodite; lemma .5 mm. long, hyaline, 2-toothed; awn 6-15 mm. long; column chestnut, very glabrous; palea small or absent.

Plains and hills up to 4,000 ft., in wet and shady places.

4. *Microstegium ciliatum* *A. Camus* in Ann. Soc. Linn. Lyon, (1921) 201 and in Lecomte Flor. Gen. de l'Indo-Chine VII. 259. Syn. *Pollinia ciliata* Trin. in Mem. Ac. Petersb. Ser. 6. 2. (1833) 306.

Annual or perennial. *Culms* 60-120 cm. tall, very branchy, decumbent at the base, then erect, nodes glabrous. *Leaf-blades* soft, thin, very variable, flat, spreading, linear-

lanceolate, narrowed at the base, finely acuminate, sessile or sometimes petioled, 4-10 cm. long, 5-12 mm. wide, glabrous below, with a few caducous tubercle-based hairs on the upper surface; margins scabrid; sheaths not auricled, rounded, very glabrous or puberulous at the nodes or with tubercled-based hairs on the margins; ligules short, membranous, glabrous.

Inflorescence a panicle made up of 2-10 false spikes, fasciculate, flexuous, 4-12 cm. long, fragile, pale-green, glabrescent, alternate or opposite on a common rhachis with the internodes 3-7 mm. apart; joints of the rhachis slender, linear, compressed, back obtusely carinate, shortly ciliate with short hairs; pedicels 1.2-2.5 mm. long, ciliate, hairs longer than those on the joints. *Sessile spikelet* 2.5-3.5 mm. long, linear-lanceolate or linear-oblong, narrow, pale; callus small, bearded. *Lower glume* papyraceous, linear-lanceolate or oblong-lanceolate, acute or sub-acute, entire or bimucronulate, margins strongly keeled, grooved on the dorsal surface; keels scabrous or pectinately ciliate; 2-4 intracarinal nerves present. *Upper glume* membranous, oblong or ovate-lanceolate, acute, aristulate or mucronulate; keel scabrous above. *Lower floret* neuter or male; lemma hyaline, narrowly oblanceolate, 1-nerved; *upper floret* hermaphrodite; lemma .5 mm. long, lanceolate or sub-orbicular, 2-toothed; awn 5-17 mm. long; palea small or absent. *Stamens* 3; anthers 1.5-2 mm. *Pedicelled spikelets* similar to the sessile; lower lemma absent.

Very common in the plains and up to 4,500 ft.

5. *Microstegium vimineum* A. Camus in. Ann. Soc. Linn. Lyon (1921) 201, and in Lecomte, Flor. Gen. de l'Indo-Chine VII. 260. Syn. Pollinia imberbis Nees in Steud. Syn. Pl. Glum. I (1854) 410.

An annual grass. *Culms* 80-100 cm. tall, decumbent at the base, then ascending, slender, very glabrous and with a deep channel in the stem. *Leaf-blades* linear-lanceolate, acuminate, base narrow, 4-8 cm. long, 6-12 mm. wide, flat, soft, spreading, often with a few deciduous hairs on the upper surface, margins very scabrous, median nerve prominent;

sheaths shorter than the internodes sub-compressed, striate, margins and throat often ciliate, nodes glabrous; ligules short, membranous.

Inflorescence made up of 2-6 false spikes (very rarely 1) 3-5 cm. long, spreading, erect, rather slender, pale-green, 6-10 mm. distant on the common rhachis, joints of the rhachis 3.5-4 mm. long, linear, slightly swollen at the top. *Sessile spikelets* 4.5-6 mm. long, lanceolate; callus obscurely bearded. *Lower glume* membranous, sub-acute, entire, 2-toothed, sub-truncate, channelled, but not much, with 2-4 intermarginal veins, 2-keeled at the top; keels scabrous or ciliate; *upper glume* laterally compressed, boat-shaped, lanceolate acute, muticous, keel scabrous above, glabrescent or ciliate, 1-3-nerved. *Lower floret* absent. *Upper floret* hermaphrodite, lemma minute, ovate lanceolate, without an awn or with one 9-11 mm. long; palea ovate, short. *Stamens* 3, anthers 3.5 mm. long, small, didynamous, oblong, not exerted at anthesis, adhering to the fruit. *Caryopsis* rounded. *Pedicelled spikelets* rather similar to the sessile.

KHASI and Jaintia Hills, NAGA HILLS, 4500 ft.

6. *Microstegium nudum* A. Camus in Lecomte, Flor. Gen. de l'Indo-Chine VII. 261. Syn. *Pollinia nuda* Trin. in Mem. Acad. Petersb. ser. 2. (1833) 307.

A very slender annual grass. *Culms* 60-90 cm. long, decumbent, rooting at the base, with divergent branches, multinoded, channelled on one side, very glabrous. *Leaf-blades* lanceolate-acuminate, base narrow, flat, soft, spreading, 2.5-10 cm. long, 5-8 mm. wide, glabrous or with a few sparse hairs above and below with tubercle bases, median nerve small, margins hardly thickened, minutely scabrid; sheaths narrow, rounded, striate, hairy, the upper shorter than the internodes; ligules short, glabrous.

Inflorescence made up of 3-6 false spikes, 4.5-10 cm. long, narrow, soft, at length widely spreading, green, flexuous, glabrescent; joints slender, filiform rounded, longer or shorter than the spikelets; inner face grooved, the outer

convex or obtusely keeled, glabrous or with acute edges, ciliolate at the base, sessile. *Spikelets* narrowly lanceolate, 3-4 mm. long, sometimes distant; callus nearly naked, obtuse, small, shortly bearded. *Lower glume* membranous, very narrow, rarely truncate or obtuse, often strongly divided; back concave, 2-keeled; keels scaberulous or ciliate; upper glume lanceolate, laterally compressed, navicular, acuminate or mucronulate; keel obtuse, scabrous; margins hyaline above, ciliate, rest very glabrous or almost, nerveless or 3-nerved, lateral nerves anastomosing. *Lower floret* barren; lemma 3-4 mm. long, linear, obtuse, glabrous or almost so, nerveless; palea absent. *Upper floret* hermaphrodite; lemma of varying length, at least 1.5-2 mm. long, linear, acute or lanceolate, 3-nerved; awn 15-18 mm. long, imperfect, capillary, very flexuous, scabrous; palea small or absent, truncate. *Stamens* 2; anthers linear-oblong, 1 mm. long. *Caryopsis* rounded, sub-ovoid, abruptly narrowed at the top. *Pedicelled spikelets* very similar to the sessile. The racemes are rather distant on the common axis and are finally spreading (divaricate). The lower glume is shallowly concave with 2 carinal and 2 other nerves within close to the carinals.

NAGA and KHASI and JAINTIA HILLS, 5,000 ft.

9. EULALIOPSIS Honda.

Spikelets binate, sessile and pedicelled, similar, seated on the articulate, fragile, compressed, slender rhachis of digitate or fascicled false spikes; fascicles with filiform peduncles on a more or less branched panicle. *Callus* densely clothed with long brown hairs. *Lower glume* flattened, 2-3-dentate, dorsally hairy at the base, 5-7-nerved, margins inflexed; upper glume cymbiform, minutely cuspidate, 3-5-nerved, with a slender awn. *Lower floret* male or barren; lemma hyaline, sparsely ciliate, elliptic; palea finely ciliate. *Upper floret*; lemma narrow, conduplicate, entire or 2-toothed, shortly awned from the tip or minute sinus; palea broad and nearly as long as the glume, densely ciliate on top.

Densely tufted perennials with a woolly rootstock and

basal sheaths. *Leaves* convolute when old, wiry; mouth of sheath ciliate.

Eulaliopsis binata (Retz.) C.E. Hubbard in Hook. Ic. Pl. sub tab. 3262. 1935. Syn. *Ischæmum angustifolium* Hack., Mon. Androp. (1889) 241.

A perennial, cæspitose grass. *Culms* 69-90 cm. tall, erect, slender, 3-4-noded, somewhat compressed, channelled along one side, very glabrous, sending out flower-bearing branches at the upper 2 or 3 nodes, often solitary, very tomentose at the base. *Leaf-blades* hardly distinct from the sheath, linear, flat, 30-60 cm. long, 2-3 mm. broad, or rolled when dry, rigid, almost erect; the base fimbriate; margins scaberulous; lower sheaths crowded, dilated at the base, covered with a dense white tomentum, persistent, surrounding the base of the culms, the upper rounded, striate, shorter than the internodes; nodes hairy or glabrous; ligule a ridge of short hairs.

Spiciform racemes 2-4, lateral, sessile, unequal, 2-4 cm. long, somewhat thick, dense; pubescence golden or dark yellow; common axis glabrous; joints of rhachis and pedicels 2-angled, 1.75-2.25 mm. long, linear, filiform; disarticulation almost oblique; hairs at the base as long as the joint, the remainder laxly and shortly ciliate. *Spikelets* 3.5-4.5 mm. long, lanceolate; callus very short obtuse, with rusty hairs, $\frac{1}{4}$ - $\frac{1}{2}$ the length of the spikelet. *Lower glume* 3-4 mm. long, sub-papyraceous, obtuse or acute, 2-3-toothed, margins not hyaline, not inflexed, back convex, without a groove, definitely 5-nerved, densely ciliate towards the base and on the margins with hairs equal to the glume in length, tufts of hair on the back, scabrid at the apex; upper glume 3.5-4.5 mm. long, membranous, papyraceous, lanceolate, obtuse, 2-toothed and mucronate, or with an awn 1-2.5 mm. long, rigid, scabrid; keel scabrid at the apex, bearded at the base, 3-5-nerved. *Lower floret* male; lemma hyaline, oblong-obtuse, 2-toothed, nerveless, glabrous or ciliolate at the top; palea shorter, linear, 2-toothed, ciliolate, obscurely 2-nerved; anthers 2 mm. long; very rarely the palea and stamens absent. *Upper floret* hermaphrodite; lemma 3.4-4.3 mm. long,

hyaline, linear, 1-nerved, glabrous, 2-toothed; awn imperfect, 6-9 mm. long, issuing from the slit; palea 2.5-3 mm. long, broadly ovate, very obtuse, entire or toothed, hyaline, nerveless; top fimbriate.

Collected in Assam for the first time in 1935 in the Naga Hills at 4,000 ft. It also is to be found in the foothills of the Assam Valley, but it is not at all common.

10. EULALIA Kunth.

Spikelets all alike or nearly so, 2-nate, one sessile, the other pedicelled, on the articulate, fragile rhachis of 2-nate, digitate or fascicled, spike-like racemes, the pedicelled falling from their pedicels, the sessile deciduous together with the contiguous joint of the rhachis and the pedicel. *Florets* typically 2; lower reduced to an empty lemma or represented by a minute scale or quite suppressed; upper always hermaphrodite. *Glumes* equal, rigidly membranous to coriaceous; lower dorsally flattened or shallowly concave (not grooved), more or less 2-keeled with inflexed margins; upper 1-3-nerved, keeled. *Lemmas* hyaline; lower muticous, sometimes much reduced or quite suppressed; upper very short, 2-lobed, awned. *Paleas* small or 0. *Lodicules* 2, small, cuneate. *Stamens* 3. *Stigmas* linear, laterally exserted. *Grain* oblong; embryo almost half the length of the grain or longer; hilum basal, punctiform.

Perennials. *Culms* simple, erect or ascending. *Leaf-blades* convolute in bud, then flat, usually narrow, gradually passing into the sheath; racemes usually coloured brown or purplish or silver.

Key to the species of *Eulalia* (after A. Camus).

Joints of the rhachis and spikelets with whitish, greyish or mauve hairs :—

Upper lemma minutely 2-toothed. .. 1. *E. fastigiata*.

Upper lemma deeply bifid :—

Upper glume awnless :—

Lower glume with 2-marginal, 2-intra-marginal nerves (at least in pedicelled spikelets) :—

Nerves anastomosing below the tip, basal sheaths bare. ..

.. 2. *E. quadrinervis*.

- Nerves not anastomosing, basal sheaths very tomentose. .. 3. *E. speciosa*.
 Lower glume with carinal nerves only, even in the pedicelled spikelets. .. 4. *E. tristachya*.
 Upper glume awned. .. 5. *E. pallens*.
 Joints of the rhachis and spikelets with golden, yellow or fulvous hairs, very rarely pale yellow :—
 Lower lemma present; lower sheaths densely silky or tomentose :—
 Tomentum on base dark brown. .. 6. *E. phæothrix*.
 Lower sheaths densely white villous. .. 7. *E. velutina*.
 Lower lemma absent, lower sheaths scarcely hairy. .. 8. *E. cummingii*.

Alternative key to the species of *Eulalia*.

- Upper lemma minutely 2-toothed. .. 1. *E. fastigiata*.
 Upper lemma deeply divided :—
 Upper and lower glumes sub-equal, lower lemma present :—
 Upper glume of sessile spikelet awned or mucronate, or at least the median nerve continued into the hyaline tissue, spikelets 3-4 mm. long. .. 5. *E. pallens*.
 Upper glume of sessile spikelet not awned or mucronate :—
 Basal sheaths naked :—
 Spikelets 5-6 mm. long. .. 2. *E. quadrinervis*.
 Spikelets 2.5-3.5 mm. long; hairs silvery. .. 4. *E. tristachya*.
 Basal sheaths woolly :—
 Hairs on joints of rhachis whitish, basal sheaths very tomentose, golden brown; leaves hairy. .. 3. *E. speciosa*.
 Hairs on rhachis-joints golden; basal sheaths with dark reddish brown tomentum. .. 6. *E. phæothrix*.
 Basal sheaths with whitish villæ; leaves glabrous. .. 7. *E. velutina*.
 Upper and lower glumes unequal; lower lemma absent. .. 8. *E. cummingii*.

1. *Eulalia fastigiata* Stapf ex Haines, Bot. B. & O. p. 1014. Syn. *Erianthus fastigiatus* Nees ex Steud., Syn. Pl. Glum. (1854) 409.

Culms 1-1.5 m. tall, rather robust, glabrous, but with appressed pubescence below the panicle. *Leaves* rigid, erect,

glaucous, flat, linear-acuminate, the narrow base hardly distinct from the sheath, 30-60 cm. long, 5-7 mm. wide, glabrous, somewhat scabrid below; margins very scabrid; median nerve thick; sheaths fimbriate at the throat, the upper shorter than the nodes; ligule very short, membranous, truncate, ciliate.

Inflorescence an ovate oblong panicle; common axis about as long as the lower branches; branches 10 cm. long; nodes numerous, simple, or the lower branched; racemes sessile, the upper shorter, spreading, erect, rather slender, coloured mauve or black-violet, densely covered with long, silky-white hairs; pedicels and joints filiform, scarcely dilated, articulate, sub-oblique at the top; back obtusely keeled, glabrous, angles ciliate with soft white hairs. *Spikelets* linear-lanceolate, 4-5 mm. long, brownish or reddish black, rather paler at the summit; callus hairs shorter than the spikelets. *Lower glume* 4-5 mm. long, papyraceous, acuminate, sub-2-toothed, keel aculeate at the top, covered at the base and sides with hairs 4.5-5.5 mm. long, slightly depressed on the back, distinctly 3-nerved or nerveless apart from the side nerves, scaberulous; upper glume papyraceous, lanceolate, acute or acuminate, keel scaberulous, 1-nerved, margins hyaline, long ciliate at the top. *Lower floret* empty; lemma 3.5-4.5 mm. long, lanceolate, linear, obtuse or sub-acute, base membranous, coloured, hyaline at the top, ciliate or not. *Upper floret* hermaphrodite; lemma 2.2-5 mm. long, hyaline, oblong, carrying an awn below the 2-toothed summit; teeth rounded; lobes short ciliate; awn scaberulous 1.25 cm. long; base 3-nerved, palea broadly oblong, very short; apex rounded, long ciliate. Ovary minute; styles slender, free to the base. *Stamens* 3; anthers 2.2-5 mm. long, golden yellow, linear.

A common grass up to 4,000 ft.

2. *Eulalia quadrinervis* (Hack.) O. Kuntze, Rev. Gen. Pl. II (1891) 775. Syn. *Pollinia quadrinervis* Hack., Mon. Androp. (1889) 158.

Perennial. *Culms* 60 cm.-1 m. tall, tufted, slender, rounded, very glabrous, or pubescent at the top. *Leaves*

sub-rigid, spreading, linear, acuminate, glabrous, or hairy below, glaucous below, green and scaberulous above; margins scabrid, 10-20 cm. long, 4-7 mm. broad; sheaths very glabrous or covered with tubercle-based hairs, the upper shorter than the internodes, the lower longer; ligules hairy.

False spikes 3-6, 7-15 cm. long, with golden-brown or mauve hairs; articulations of the rhachis and pedicels 2.5-3 mm. long, hairs stiff and spreading, white or mauve; joints of the rhachis rather oblique; joints only swollen at the tip. *Spikelets* oblong-lanceolate, sub-acute, 5-6 mm. long, pale-brown, callus hairs long, white. *Lower glume* 5-6 mm. coriaceous, papyraceous, hyaline at the apex, ovate-lanceolate, obscurely truncate, margins inturned, back depressed, scabrous, keels hispid above, base with long, soft, white or mauve hairs, 4-nerved; nerves anastomosing below the tip; upper glume 5-6 mm. long, papyraceous, hyaline at the top, smooth shining, lanceolate, acute, slightly apiculate, keel glabrous, obscurely 3-nerved. *Lower floret* empty; lemma 4.5-5.5 mm. long, hyaline, oblong-lanceolate, acute, 2-nerved, ciliate. *Upper floret* hermaphrodite; lemma 2.5-3 mm. long, broadly cuneiform, oblong, hyaline, ciliate towards the top, bilobed near the base, lobes acute. awn 17-20 mm. (in pedicelled spikelets 14 mm.) long, palea oblong, short; lodicules shortly hairy. *Stamens* 3; anthers 3.5 mm. long. *Stigmas* lanceolate, purplish, blunt, 2.5-3 mm. long, a little longer than the style.

Very common in the KHASI HILLS about 4,000 ft.; specimens have been found in the plains below Cherrapunji.

3. *Eulalia speciosa* (Hack.) O. Kuntze, Rev. Gen. Pl. II. (1891) 776. Syn. *Pollinia speciosa* Hack., Mon. Androp. (1889) 159.

Perennial. *Culms* 80 cm.-1.2 m. tall, slender, firm, many noded, smooth, pubescent below the inflorescence. *Leaf-blades* linear, acuminate, setaceous, 30-50 cm. long, 4-7 mm. broad, flat, rigid, erect, very glabrous or hairy, (densely tomentose in Khasi specimens) glaucous above, margins scarcely scabrid, median nerve slender; sheaths rounded, narrow, very glabrous or pubescent at the top and about the

nodes; ligules very short, truncate, reddish, membranous, glabrous or ciliolate.

Inflorescence formed of 4-8 spiculate branches, 7-20 cm. long, spreading, erect, sometimes branched at the base; hairs greyish or reddish. Common axis ciliate, nodes 3-5 mm. apart, alternate; joints and pedicels scarcely longer than 2.5-2.75 mm., linear, sub-dilated, trigonous, ciliate on the angles; hairs rigid, white or grey. *Spikelets* oblong, 5.5-5 mm. long, reddish below the middle, paler above and with green margins; callus .8 mm. long; callus hairs 1-1.2 mm. long. *Lower glume* papyraceous, truncate, emarginate, margins inturned, ciliate with white, spreading hairs; back almost depressed, densely hairy in the lower part; apex scabrous, nerveless apart from the carinals; upper glume broadly oblong, narrowly truncate, margins inturned, hyaline, ciliate; keel glabrous, slightly pubescent towards the tip, elsewhere smooth and shining. *Lower floret* empty; lemma 3.5-5 mm. long, broadly oblong, obtuse, base membranous and coloured, top hyaline, margins infolded, ciliate. *Upper floret* hermaphrodite; lemma 3.75-4 mm. long, narrowly 2-fid; lobes acute, eciliate, awn tortuous and twisted, 16-20 mm. long; palea very short, ovate, ciliolate; lodicules glabrous. *Pedicelled spikelets* have the lower glume 3-nerved, i.e., 2 carinals and 1 in the centre. Anthers 2.5 mm. long. The basal sheaths are not always woolly especially in young specimens, very woolly with golden wool in old specimens.

A common hill grass, 4-7,000 ft.

4. *Eulalia tristachya* O. Kuntze, Rev. Gen. Pl. II. (1891) 775. Syn. *Pollinia argentea* Trin. in Bull. Soc. Ac. Petersb. I. (1836) 71.

Perennial. *Culms* .3-1.2 m. erect, tufted, dense, somewhat robust, rounded, smooth, simple or branched, shortly exserted at the top, very glabrous. *Leaf-blades* rather rigid and erect, linear, acuminate, setaceous, not contracted at the base, 10-45 cm. long, 1.5-6 mm. broad, green, very glabrous or with appressed pubescence near the top and on the margins; ligule very short, .3 mm. long, truncate, bearded.

Inflorescence a panicle of 2-12 false spikes slender, 4-15 cm. long, carrying distant spikelets; rhachis firm, filiform, compressed; joints and pedicels 1.7-3 mm. linear, filiform, trigonous; hairs white, long. *Spikelets* oblong, 2.5-3 mm. long or somewhat longer (pedicelled shorter) callus .6 mm. long, obtuse; *lower glume* 2.5-3 mm., papyraceous and hard at the base, membranous hyaline at the top, linear-oblong, depressed on the back, pale brown below the middle, pale yellow above, narrowly truncate, no central nerve; apex entire or keel nerves excurrent and 2-mucronate, margins inturned, stiff ciliate above, elsewhere hairs soft, white, erect. *Upper glume* 2.5-3 mm. long, hyaline and emarginate at the top, broadly oblong, obtusely carinate, 1-nerved, margins similar to those of lower glume but shortly ciliate. *Lower floret* empty; lemma 2-3 mm. long, hyaline, whitish, linear, oblong, obtuse, nerveless, ciliate; base coloured. *Upper floret* hemaphrodite; lemma 1.25-2.25 mm. long, small, very narrow, linear-oblong, divided into two subulate lobes; awn slender, 10-20 mm. long; palea absent. *Lodicules* small, wedge-shaped. *Anthers* 2.5 mm. long. *Pedicelled* spikelets similar to the sessile but narrower.

Very common in the KHASI and JAINTIA HILLS, 4-5,000 ft.

5. *Eulalia pallens* (Hack.) O. Kuntze, Rev. Gen. Pl. II (1891) 775. Syn. *Pollinia pallens* Hack., Mon. Androp. (1889) 156.

Perennial. *Culms* 60-90 cm. tall, erect, slender, glabrous and smooth; base naked, clothed with the sheaths of old leaves, glabrous; roots fibrous. *Leaf-blades* narrow, linear, 15-25 cm. long, 1.2-2.5 mm. wide, tapering from a base which is not distinct from the sheath, to a filiform tip, glabrous beneath, hairy on the upper surface; margins scaberulous and revolute; sheaths rather smooth and glabrous; ligule very short, membranous, minutely ciliate.

Racemes about 5, 5-10 cm. long, slender, silky hairy. *Spikelets* narrowly lanceolate, about 3 mm. (up to 4 mm.) long, often purple or yellow. *Lower glume* narrow, membranous, bicuspidate, shortly villous, 2-nerved; upper glume lanceolate, laxly villous, 1-nerved, the nerve being

continued out to the edge of the hyaline margin or produced into a short arista; keels and margins ciliate. *Lower floret* empty; lemma oblong, obtuse, ciliate, 2.5-3 mm. long; *upper floret* hermaphrodite; lemma oblanceolate, 2.2-5 mm., ciliate, narrow, 2-fid, awn 2-3 times as long as the spikelet, adnate portion of awn forked about half way down; palea broadly ovate or orbicular, entire, hyaline, ciliate, 2 mm. long; anthers 3 purple, linear, 2.2-5 mm. long.

Myntlah, 2,500 ft. in swamps. In a specimen collected here the racemes are yellow; stigmas yellow; anthers purple. Also occurs in the Naga Hills 5,000 ft.

6. *Eulalia phæothrix* (Hack.) O. Kuntze, Rev. Gen. Pl. II. (1891) 775. Syn. *Pollinia phæothrix* Hack., Mon. Androp. (1889) 168.

Perennial. *Culms* 2 m. and more, erect, robust or slender, rounded, 3-4 noded, shortly bare at the top, hairy below the inflorescence, and on the upper nodes; the base is covered with a dense, brownish-red tomentum. *Leaf-blades* erect, spreading, linear, acute, hardly distinct from the sheath, rigid, often convolute, glabrous or with a few hairs on the lower surface, scabrid above and on the margins, 15-30 cm. long by 1.5-9 mm. broad, basal sheaths woolly, (hairs crisp, red brown), the upper shorter than the internodes, not auricled, often pubescent towards the summit, the upper sometimes spathiform; ligules very short, membranous, ciliolate.

Inflorescence a panicle made up of 2-6 false spikes, 5-20 cm. long, simple, erect, spreading, flexuous, silky hairy, shining, light brown or dark brown, fawn or golden; rhachis compressed, plano-convex, fragile; joints with an auricled appendage; joints and pedicels densely hairy with brownish or whitish hairs. *Spikelets* linear oblong, 4-5 mm. long, callus very short, hairy. *Lower glume* papyraceous, oblong or linear-oblong, truncate, margins incurved, nerveless or 2-nerved, back flat with, especially towards the margins, stiff hairs, golden or reddish in colour, almost glabrous at the top; upper glume papyraceous, ovate-oblong, summit narrowly truncate, obscurely keeled, with long hairs towards the

middle and at the base, shortly pubescent at the tip, not aristate, 1-nerved; margins hyaline and ciliolate. *Lower floret* empty; lemma 4.5 mm. long, base coloured, oblong or ovate-oblong, obtuse, nerveless, ciliate above the middle. *Upper floret* hermaphrodite; lemma 1.3-1.6 mm., linear-oblong, opaque in the middle, hyaline towards the margins, deeply bifid; segments narrow, linear, rather sharp, ciliate; awn 10-12 mm. flexuous, very glabrous; palea obovate, truncate, fimbriate at the top, often scarcely shorter than the lemma. *Anthers* 2.2-5 mm. long. *Pedicelled spikelet* smaller and narrower than the sessile.

Common in the KHASI and JAINTIA HILLS.

7. *Eulalia velutina* (Hack.) O. Kuntze, Rev. Gen. Pl. II (1891) 775. Syn. *Pollinia velutina* Hack., Mon. Androp. (1889) 169.

Perennial. *Culms* 8-1 m. erect, rounded, silkily pubescent below the inflorescence, often somewhat rose coloured. *Leaf-blades* linear; base narrow, shortly acuminate, erect, 20-30 cm. long, 5-6 mm. broad, very glabrous, margins smooth; sheaths very glabrous even on the nodes, the lower white velvety, the upper spathiform at first; ligules 1 mm., truncate, reddish, membranous.

Inflorescence an erect or drooping panicle of 5-6 false spikes, sometimes more, 7-10 cm. long; rhachis extremely fragile, thick; articulations oblique, strongly auricled, appendaged, joints and pedicels 3-5 mm. long, densely covered with rigid golden hairs (1.75-2 mm. long). *Spikelets* 5.5 m. long, covered with fulvous golden hairs; callus shortly bearded. *Lower glume* papyraceous, contracted at the middle, very narrowly truncate, slightly bimucronate, margins laxly inflexed, back flat or slightly concave, covered entirely with fulvous hairs which are rigid and very dense, 2-nerved; upper glume papyraceous, lanceolate, suddenly very acute, 1-nerved, keeled, shortly hairy along the keel; the remainder of the back shining. *Lower floret* empty; lemma 2.5 mm. long, lanceolate, acute, 2-nerved. *Upper floret* hermaphrodite; lemma 4.5 mm. long, hyaline, glabrous, shortly obtuse and 2-toothed at the apex, 3-nerved at the base; awn 10-11 mm.

long; palea 1-1.25 mm., obovate, truncate, ciliolate; anthers 3 mm. long.

KHASI and JAINTIA HILLS, 4-5,000 ft.

8. *Eulalia cummingii* A. Camus in Lecomte, Flor. Gen. de l'Indo-Chine VII, 250. Syn. *Pollinia cummingii* Nees in Hook., Kew Journal II (1850) 98.

Perennial. *Culms* low, slender, ascending, 25-60 cm. long, pubescent, yellowish at the top, 5-6 noded. *Leaf-blades* flat, spreading, rather rigid, linear, acuminate, abruptly contracted at the base, 5-20 cm. long, 3-5 mm. wide, green, very glabrous below, sparingly scabrid above and on the margins, rarely with scattered hairs; upper sheaths very glabrous, narrow, rounded or those of the innovations sub-compressed, the lower densely crowded, the lowest scale-like; ligule very short, .5 mm., truncate, membranous, coloured, glabrous or ciliate.

Inflorescence of 2-4 false spikes, 4-9 cm. long, common axis hairy; joints of the rhachis and the pedicels 2.2-2.5 mm. long, linear, backs and sides covered with dense golden brown hairs. *Spikelets* oblong, 4 mm. long, callus short obtuse, hairs 1.3-1.7 mm. long. *Lower glume* 2-nerved, membranous, papyraceous, narrowly truncate, ciliate at the top; margins inflexed below the summit, involute at the base; back flat, densely tomentose below the middle; pubescence appressed, golden brown, exceeding the top of the glume. *Upper glume* papyraceous, membranous, oblong, truncate, keeled, laxly hairy above the middle, ciliate at the summit, 1-nerved. *Lower floret* absent. *Upper floret* hermaphrodite; lemma .6-.8 mm. broader than long, rather thick, sub-3-nerved at the base, divided at the top into two lobes which are short, acute, ciliolate or almost glabrous; awn 1.2-1.5 mm. long, slender. *Anthers* 2.5 mm. long. *Ovary*: style and stigmas almost equal 2.5 mm. long.

Khasi and Jaintia Hills, 4,000 ft.

11. PSEUDOPOGONATHERUM A. Camus.

Inflorescence in spiciform racemes, often numerous, sometimes branching at the base, close on a glabrous common

axis, sub-sessile; pedicels glabrous; spikelets very small, 2-nate, often all pedicelled and falling from the pedicel at maturity; the rhachis not breaking up easily; more rarely one pedicelled and the other sessile and remaining attached to the pedicel and the adjoining joint. *Lower glume* rounded on the back or almost so; margins involute or inflexed. *Upper glume* obtuse, glabrous often aristate or mucronate. *Lower floret* barren; lemma membranous, ovate-obtuse. *Upper floret* hermaphrodite; lemma stipitate, rarely linear and extremely narrow; awns often long, ciliate.

Annuals with the habit of *Pogonatherum*; culms slender, very glabrous; leaves narrowly linear or setaceous at the tip, rolled when dry, somewhat rigid.

Pseudopogonatherum contorum A. Camus in Lecomte, Flor. Gen. de l'Indo-Chine, VII, 255. Syn. *Pollinia articulata* Trin. in Bull. Soc. Acad. Petersb. I (1836) 71.

Annual. *Culms* 20-50 cm. tall, very slender, densely tufted, erect, rounded, very glabrous, internodes short, shortly exerted at the top. *Leaves* erect, flexuous, filiform or narrowly linear, acuminate, more or less scabrous, sub-dilated at the base, sometimes hairy, 10-30 cm. long, 1.5 mm. broad; median nerve prominent below, showing as a white line above; sheaths rounded, narrow, glabrous, even at the base of the culms, where they are not crowded; ligules very shortly ciliate.

Inflorescence a dense panicle, the common axis carrying 3-20 close racemes, alternate or opposite, rarely 4-nate, silky-white, sub-erect, simple or divided at the base, 4-6 cm. long; rhachis tardily breaking up, back very glabrous; margins with hairs which become longer at the summit; joints equal in length to the pedicel. *Spikelets* all pedicelled, lanceolate, 1.5-2.5 mm. long; callus obtuse, .4 mm. long, with white hairs .4-.8 mm. long. *Lower glume* papyraceous, membranous at the summit, shining, obtuse or somewhat truncate, with 2 sharp teeth, margins narrowly inflexed, slightly depressed between the keels, which are covered in the upper portion with hairs which are almost erect, nerveless apart from the keel nerves; upper glume papyraceous,

ovate-lanceolate, obtuse, keeled, 1-nerved; margins glabrous, or puberulous close to the keel, awn 7-15 mm. long. *Lower floret* barren; lemma .75-1.25 mm. long; ovate-obtuse, nerveless, glabrous. *Upper floret* hermaphrodite; lemma membranous, linear, 1-nerved, glabrous, almost entire, bifid or 2-toothed; awn robust, up to 3 cm. long, ciliate below; palea absent. *Lodicules* 2. *Stamens* 3; anthers .5-.7 mm. long. *Stigmas* short.

KHASI and JAINTIA HILLS 4-6,000 ft.

12. POGONATHERUM P. Beauv.

Inflorescence a solitary raceme at the summit of the stem and of its branches. *Spikelets* imbricate, 2-nate at each node of the rhachis, the pedicelled female, rounded, articulated on the pedicel, the sessile hermaphrodite, falling together with the contiguous joint of the rhachis, both 1-2-flowered, long awned; glumes membranous, the lower muticous, truncate or rounded at the apex, without a keel; the upper of the same length or longer, keeled, acute or 2-toothed, awn imperfect, slender. *Lower floret*; lemma hyaline and empty or sometimes absent and the palea persisting; the floret is male, with 2 stamens or more rarely hermaphrodite. *Upper floret* hermaphrodite; lemma narrow, dentate or 2-fid, hyaline, awned; the awn arising from the sinus, capillary, perfect or almost so, long; palea equalling the lemma in length or shorter, hyaline, nerveless. *Lodicules* absent. *Stamens* 1-2; anthers linear-oblong. *Style* capillary; *stigmas* linear-oblong, exerted from the top of the spikelet. *Caryopsis* obovate, slightly laterally compressed, back more convex than the ventral face; embryo $\frac{2}{3}$ the length of the caryopsis.

Usually perennials, densely caespitose. *Culms* slender branchy. *Leaves* linear or linear-lanceolate, acuminate.

Blatter and McCann in Bombay Grasses, 1935, state that the pedicelled spikelet is male or neuter; actually it is usually female, occasionally male or empty, in Assam specimens.

Key to the species of *Pogonatherum*.

- Spikelets 4 mm. long, or over. 1. *P. rufobarbatum*
 Spikelets less than 4 mm. long :—
 Lower floret present; sessile spikelets 2.5-3 mm. long; callus hairs 1-1.5 mm.; glumes sub-equal; awn 15-18 mm.; hermaphrodite flowers with 2 stamens, rarely 1. 2. *P. paniceum*.
 Lower floret absent; sessile spikelets 2 mm. long, callus hairs 2 mm. long; upper glume longer than the lower; awn 18-22 mm.; hermaphrodite flowers with 1 stamen, rarely 2. 3. *P. crinitum*.

1. *Pogonatherum rufobarbatum* Griff. Notul. III (1851) 81.

Perennial. *Culms* 25-60 cm. tall, densely tufted, terete, smooth and shining, glabrous, wiry. *Leaf-blades* lanceolate, tapering to a fine point and also to the sheath, 5-10 cm. long, up to 6 mm. broad, many-nerved, median nerve prominent below, smooth and glabrous, margins imperfectly thickened, smooth; sheaths rather loose, smooth and glabrous, auricled; ligules convex upwards, 1 mm. long, membranous, continuous with the auricles of the sheath.

The inflorescence consists of a false spike or raceme, 2.5-6 cm. long, up to 4 mm. broad; rhachis rather stout, angled; ciliate on the angles, joints $\frac{2}{3}$ the length of the spikelets about 2.5 mm. long; pedicels similar (2 mm.), but rather more slender. *Spikelets* oblong, always 2-flowered, callus small, callus hairs shorter than the spikelet. *Sessile spikelet*; lower glume 3.25 mm. long, oblong, two-lobed or auricled at the top, ciliate along the hyaline margins at the top, obscurely 3-5 or even 7-nerved; upper glume 3-3.5 mm. long, oblong, shortly two-lobed, median nerve prominent and carried upwards between the lobes into an awn 15-20 mm. long, keeled, scaberulous or hairy above, keel scaberulous ciliate on the lobes. *Lower floret* male; lemma 3.2-5 mm. long, lanceolate, acute, hyaline, glabrous, nerveless; palea as long or smaller, broadly oblong, obtuse, glabrous. *Stamens* 2, anthers 2.5 mm. long. *Upper floret* hermaphrodite; lemma 3 mm. long, lanceolate, hyaline, lobed for $\frac{1}{3}$ - $\frac{1}{2}$ its length, glabrous; awn 17-20 mm. long, column

brownish and ciliate (hirsute). *Palea* hardly shorter than the lemma. The anthers in this floret are 3 mm. long.

Pedicelled spikelets linear-oblong, 3 mm. long, the callus hairs almost equalling the spikelet; lower glume 2-nerved, pilose on the back, lower lemma absent, upper lemma similar to that of the sessile spikelets, containing a female floret.

Growing on rocks in streams in the Khasi Hills where it is continually washed by spray. Quite different in appearance from *P. paniceum* and a good species.

2. *Pogonatherum paniceum* Hack. in All. Bot. Zeit. XII. 178. Syn. *Pogonatherum saccharoideum* Beauv., Agrost. 176, t. 11, fig. 7.

A caespitose perennial. *Culms* 10-50 cm. tall, in dense tufts; nodes numerous, shining; primary branches solitary and rarely simple; branchlets filiform, very glabrous. *Leaf-blades* soft, spreading, pale green, linear or linear-lanceolate, acuminate, base rounded, abruptly contracted, the older leaves flat, those at the top shorter, 2-7 cm. long, 1-4 mm. wide, tubercular, scabrid or scaberulous; sheaths lax, sub-compressed, smooth; throat fimbriate; ligules reduced.

Inflorescence consisting of a terminal raceme or false spike, 1.5-3 cm. long; joints and pedicels 1-1.5 mm. long, linear-filiform, somewhat dilated at the top, depressed-trigynous, margins with white hairs up to 3 times as long as the joints. *Sessile spikelets* linear-oblong, fulvous, 2.5-3 mm. long; callus small, with a few white hairs. *Lower glume* 2-3 mm. long, membranous or almost papyraceous at the base, broadly linear-oblong, often a little truncate at the top, back convex, 2-3-nerved, scaberulous, often glabrous and ciliate below the apex, sometimes hispid. *Upper glume* 2.5-3 mm. long, membranous, broadly lanceolate, obtuse, keels hispid or scabrid, very hairy at the apex, awn 12-14 mm. long, slender. *Lower floret* male with 2 stamens, rarely hermaphrodite; lemma hyaline, oblong-ovate, nerveless, ciliate at the top, 1.5-2.5 mm. long; palea linear-oblong, 2-toothed, rarely absent. *Upper floret* hermaphrodite; lemma 1.5-2.5 mm., hyaline, narrow, linear or linear-oblong, almost

keeled, toothed, hyaline, glabrous, nerveless. *Stamens* 2, very rarely 1.

Pedicelled spikelet usually smaller than the sessile, rounded; lower floret absent. *Upper floret* female or very rarely male or neuter.

Very common in shady places up to 5,000 ft.

3. *Pogonatherum crinitum* Kunth, Enum. I. (1833) 478.

Close to *P. paniceum* Hack. for which it is often mistaken. It is however more slender, the *sessile spikelets* are at most 2 mm. long, more truncate and broader above; upper glume is longer than the lower, glabrous or shortly ciliate, and less obtuse; lower floret absent; in the upper floret the lemma is more toothed, the awn is 18-22 mm. long, the palea is $\frac{2}{3}$ the length of the lemma. *Stamens* often 1 rarely 2.

Found in similar situations to the last named species.

13. APOCOPIS Nees.

Racemes spiciform, 2-nate, or sub-digitate, closely crowded and resembling a single raceme or spike; rhachis with a ring of hairs at the nodes, margins ciliate, joints numerous, fragile, linear, back convex or sub-keeled, ventral face flat. *Spikelets* narrowly imbricate, 2-nate, one reduced to a short pedicel situated on a very reduced callus, the other sessile, well-developed, dilated and truncate at the top, dorsally sub-compressed, 2-flowered; lower floret male, the upper floret female or rarely hermaphrodite, falling at last with the contiguous joint of the rhachis, aristate or almost muticous; lower glume broad, obovate or ob-cordate, truncate or emarginate, muticous, margins flat, not inflexed, not keeled, sometimes a little curved at the base; upper glume narrow, sub-carinate, margins incurved, muticous. *Lower floret* male, stamens 2, or neuter; lemma hyaline; palea often similar to the lemma. *Upper floret* female or hermaphrodite; lemma often shortly mucronate or aristate between the teeth at the summit, 1-nerved, palea hyaline, nerveless. *Lodicules* 0. *Stamens* often absent in the upper floret, rarely 2; anthers

linear. *Styles* very short; stigmas long linear, shortly pubescent, exserted from the apex of the spikelet. *Caryopsis* small narrowly oblong; embryo broad, half the length of the caryopsis.

Low grasses. Leaves narrow.

Apocopis paleacea (*Trin.*) *Hochr.*, in Bull. N. Y. Bot. Card. 6; 262. (1910) Syn. A. Royleana Nees in Proc. Linn. Soc. 1. (1841) 94.

A perennial grass with a creeping rhizome. *Culms* 2-1 m. tall, ascending, obscurely grooved, long exerted at the top. *Leaf-blades* broadly lanceolate-linear, acuminate, base hardly contracted, rounded, 4-12 cm. long, 4-10 mm. broad, the older leaves flat, rigid, green, almost erect, hairy with scabrid margins; sheaths lax, striate, with many tubercle-based hairs between the nerves, throat hairy; ligule very short, truncate, erose.

Inflorescence of erect racemes, 2-4-nate, 3-4 cm. long, glabrescent, streaked with purplish-black and straw-yellow; common peduncle exerted; joints of the rhachis about $\frac{1}{3}$ - $\frac{1}{4}$ the length of the spikelet, rather thick; disarticulation transverse; margins usually ciliate with long reddish hairs. *Sessile spikelets*, 4-5 mm. long, truncate, obovate or sub-cuneiform-obvate, almost muticous, all alike; callus obtuse, with hairs 1-1.25 mm. long; lower glume 3.75-4.75 mm. long, coriaceous-papyraceous, broad truncate at the top, toothed and slightly ciliate, back flattish, glabrous, smooth or scaberulous, 6-10-nerved, violet black in herbarium, dark brown in living specimens, save at the top, which with the margins is whitish-yellow; upper glume 4-5 mm. long, papyraceous, broadly oblong, truncate, top slightly ciliate, margins inrolled, 3-5-nerved, glabrous, brown. *Lower floret* male; lemma 4-5 mm. long, hyaline, ovate-oblong, narrowly truncate, summit ciliate, margins flat, 1-nerved; palea similar to the lemma, nerveless; anthers 3 mm. long. *Upper floret* female or hermaphrodite; lemma 3.75-4.75 mm. long, hyaline, lanceolate, 2-toothed, with obtuse teeth, mucronate, or shortly awned, with 1 thick nerve;

awn with a sub-twisted base, 3-5 mm. long; palea 3·5-4·5 mm. hyaline, ovate, truncate, nerveless, glabrous. *Stamens* 0, rarely 2. *Stigmas* 4 mm. long. *Pedicel* sterile, 1-2 mm. long, thin, with yellowish hairs.

Common in the KHASI and JAINTIA HILLS on grassy slopes 2-5,000 ft.

14. SORGHUM Pers.

Spikelets 2-nate, those of each pair different in shape and sex, one sessile the other pedicelled or represented by a pedicel only, on the articulate fragile or (in cultivated forms) tough rhachis of paniced few-jointed racemes; the sessile spikelet falling with the contiguous joint and the accompanying pedicelled spikelet or at least its pedicel. *Florets* 2, the lower reduced to an empty lemma, upper hermaphrodite in the sessile, male or neuter in the pedicelled spikelets if present at all. Sessile spikelets dorsally compressed. *Glumes* equal, coriaceous, at least when mature, rarely permanently chartaceous, muticous, upper with a broad flattened or convex back, with the margins narrowly inflexed near the tips and otherwise involute; upper boat-shaped, keeled upwards with narrow hyaline, usually upwards ciliate, margins. *Lemmas* hyaline, ciliate, of lower floret 2-nerved or nerveless, of upper oblong to ovate, 2-dentate or 2-lobed with the lobes free, or more or less adnate to a perfect, or more or less reduced, awn or a mucro arising from the sinus, rarely entire and mucronate or muticous, 1- or 3-nerved. *Lodicules* 2, glabrous or ciliate; palea hyaline, often minute or 0. *Stigmas* laterally exerted; styles terminal or subterminal. *Caryopsis* mostly obovoid. *Pedicelled spikelets* if present much narrower than the sessile, lanceolate to subulate, male or neuter, sometimes reduced to the glumes or one glume only, or quite suppressed. *Glumes* permanently herbaceous, like the 2-1-nerved hyaline lemmas, awnless.

Annual or perennial, often robust grasses. *Leaf-blades* convolute in the bud, usually flat, herbaceous, often large. *Panicles* erect or nodding with verticillate, or scattered branches, often large in the spontaneous species, mostly loose

in the cultivated forms, frequently narrowly contracted to compact.

Key to the species of *Sorghum*.

Primary branches of the panicle undivided,
up to 10 cm. long. 1. *S. nitidum*.
Primary branches of the panicle branched, up
to 20 cm. long. 2. *S. halepense*.

- 1. *Sorghum nitidum* Pers., Synops. Pl. 1. (1805)**
101. Syn. *Andropogon nitidus* Kunth, Revis. Gram. I. (1829)
166. *Andropogon serratus* Thunb., Flor. Jap. (1784) 41.

A tall tufted erect grass 1 m. to 2.5 m. high; culms densely villous at the nodes. *Leaves* setaceously acuminate, 20-60 cm. long, up to 1 cm. broad, with a prominent white midrib, glabrous or sparsely hairy on both surfaces; hairs often tubercle-based; margins scabrid, often coarsely so, thickened and cartilaginous; sheath terete below, sub-keeled above, glabrous or more or less hairy with a silkily villous mouth; ligule 1-1.5 mm. long, membranous, truncate.

Inflorescence an elongate panicle, oblong; rhachis glabrous; lower branches distantly whorled, upper alternate; branches capillary, flexuous, delicately scabrid, naked below. *Racemes* at the ends of the branches, few-spiculate. *Spikelets* 2-nate, differing in shape and sex, the pedicelled often being represented by the pedicel only or a rudimentary spikelet. Joints and pedicels ciliate on the margins, $\frac{2}{3}$ the length of sessile spikelet, callus densely hairy. *Sessile spikelets* broadly oblong, elliptic-acute or obtuse in outline, 4 mm. long, callus rounded; lower glume, shape of the spikelet, dorsally flattened with incurved margins, brown hairy and hispid on the keels, 5-7-nerved, very dark brown or black, polished when ripe; upper glume similar in size, rounded on the back, obtusely acuminate, hispid at the top; margins hyaline, ciliate. *Lower floret* barren; lemma 3.5 mm. long, hyaline, margins inrolled clasping the base of upper floret, 2-keeled, ciliate; palea absent. *Upper floret* hermaphrodite; lemma ovate, 2 mm. long, hyaline ciliate on the margins, shortly awned or not; stigmas 2, feathery; anthers 3, 2.5 mm. long; palea absent.

Very common in grassland in the hills. It may be found in flower from August to December.

2. *Sorghum halepense* (Linn.) Pers., Synops. Pl. I (1805) 101. Syn. *Andropogon halepensis* Brot., Flor. Lusit. I (1804) 89.

A perennial grass from a long creeping stoloniferous rootstock. *Culms* up to 2.5 m. tall, sometimes decumbent at the base with numerous adventitious roots, erect, simple or sparingly branched, leafy; nodes finely silky pubescent. *Leaves* broadly linear-lanceolate, setaceously acuminate, somewhat tapering to the broad, rounded, sub-amplexicaul base, glabrous, smooth; margins scabridly serrulate; midrib stout; junction of sheath and blade often pubescent; sheaths somewhat loose, glabrous, striate; ligules short, membranous, erose, strigose behind.

Inflorescence a decompound panicle, 15-30 cm. long, branches 1-3-nate, distant, sub-erect, diffuse, angled and often scaberulous on one of the angles, villous at the axils, naked for half their length; racemes at the tops of the branches and branchlets, 10-25 mm. long, 3-4- or more-noded; joints and pedicels similar, nearly as long as the spikelets. *Sessile spikelet* ovate-lanceolate, elliptic, or narrowly elliptic, acute, 4-5 mm. long. *Lower glume* dorsally flattened or convex, ovate or elliptic-acute, 5-12-nerved, margins involute; *upper glume* lanceolate, acuminate, chartaceous, shining, 5-7-nerved. *Lower floret* barren; lemma broadly lanceolate, hyaline, margins inflexed. *Upper floret* hermaphrodite; lemma 2.5-3 mm. long or somewhat longer, obtuse, ciliate, 2-lobed, with an awn up to 12 mm. long from the sinus or the awn quite suppressed; palea narrow, hyaline, minute or absent. *Pedicelled spikelets* as long as the sessile but much narrower; lower glume narrow-lanceolate, 7-nerved, dorsally grooved, keels hispid, margins inflexed; upper glume cymbiform, lanceolate, acuminate, 5-nerved. *Lower floret* barren; lemma 2-keeled, glabrous, sparsely ciliate; upper floret male or neuter or quite absent. *Stamens* 3. Anthers 3 mm. long; lodicules 2 cuneate, ciliate on the angles.

Not common. Found in the plains.

15. PSEUDOSORGHUM A. Camus.

Annual. *Panicle* contracted dense; primary branches almost always solitary, erect, divided to the base, the secondary sometimes verticillate. *Racemes* spiciform, dense, sessile or almost so; rhachis fragile; joints and pedicels slender without a translucent groove, hairy; joints without appendages. The pedicelled spikelets all different from the sessile in shape and sex, male or neuter, more or less reduced, the sessile very imbricate, dorsally compressed, lanceolate; callus small hairy, lower glume with ciliate keels; upper glume more or less keeled. *Lower floret*: lemma almost equalling the glumes. *Upper floret*: lemma much shorter, with a slender sometimes caducous awn; palea equal to the lemma, smaller or absent.

Culms decumbent at the base finally erect. *Leaf-blades* linear or sub-lanceolate-linear, flat, rigid, somewhat glaucous; sheaths compressed, narrow or lax, hirsute or glabrous.

Pseudosorghum fasciculare A. Camus in Bull. Mus. Hist. Nat. Paris XXVI (1920) 662. Syn. *Andropogon fascicularis* Roxb., Fl. Ind. I (1832) 265.

Culms 6-1.5 m. tall, erect but decumbent and branching at the base, slender, rounded, glabrous, bare at the top, simple or bearing flowering branches. *Leaf-blades* linear to sub-lanceolate-linear, 30-50 cm. long by 4-8 mm. wide, contracted at the base, acuminate-setaceous at the tip, flat, rigid, glaucescent, scaberulous; median nerve somewhat thick; sheaths compressed, tight or somewhat lax, hirsute or almost glabrous, throat hairy; ligules 2 mm. long, ovate, often ciliate.

Inflorescence an oblong panicle 2.5-8 cm. long, green or purplish; main axis slender, glabrous, hairy at the nodes; branches almost always solitary, alternate, erect, divided to the base and shortly naked; racemes spiciform, sub-sessile, 6-2 cm. long, rather slender, spreading, erect or almost erect, sparsely hairy, of 2-6 flattened rhachis joints, smooth; joints and pedicels linear, round or compressed, distinctly stiff-ciliate with white or purple hairs. Sessile spikelets 4-5 mm. long, lanceolate; lower glume coriaceous, papyraceous, ovate-lanceolate, narrowly truncate at the top, glabrous and flat on the

back, smooth, shining, 7-9-nerved, with keels shortly ciliate towards the top, obtuse, hairy; hairs 1.3-1.7 mm. long; upper glume papyraceous, elliptic-lanceolate, acute, keeled below the summit and scaberulous, the rest very glabrous, shining, 5-7-nerved. *Lower floret*; lemma 4.5 mm. long, lanceolate; margins infolded, 2-nerved ciliate. *Upper floret* hermaphrodite; lemma much shorter, bifid, lobes triangular, ciliate; awn 8-15 mm. long; column blackish; palea equal or smaller than the lemma, broadly ovate or lanceolate, sometimes absent. *Stamens* 3; anthers 1.5 mm. long. *Pedicelled spikelets* male or neuter, 3.5-4 mm. narrower than the others; lower glume many-nerved with scaberulous keels; upper glume acute, 7-nerved. *Lower floret*; lemma obovate-oblong, ciliate.

Fairly common in the plains districts.

16. VETIVERIA Thouars ex Virey.

Spikelets 2-nate, of each pair sub-similar, differing in sex, one sessile the other pedicelled, on the articulate fragile rhachis of copiously whorled, rarely paniced, peduncled, 3- to many-jointed racemes, the sessile spikelets falling with the contiguous joint and the accompanying pedicelled spikelet, or at least the accompanying pedicel; joints and pedicels slender, slightly and gradually thickened upwards. *Florets* 2, lower reduced to an empty lemma, upper hermaphrodite in the sessile, male in the pedicelled spikelets. *Sessile spikelet* slightly compressed laterally, awned or awnless. *Glumes* equal; lower more or less coriaceous or chartaceous with a broad rounded back and sub-inflexed margins, muriculate over the back, usually muticous; upper boat-shaped, keeled upwards, with broad, hyaline, ciliate margins, spinous-keeled, muticous, mucronate, or aristate. *Lemmas* hyaline, of the lower floret 2-nerved, of the upper minutely 2-dentate, muticous or mucronate, with a perfect or imperfect awn from the sinus. *Palea* minute, hyaline, nerveless. *Lodicules* 2, glabrous. *Stamens* 3. *Stigmas* laterally exerted. *Styles* sub-terminal. *Grain* oblong, top slightly oblique. *Pedicelled spikelet* dorsally compressed; glumes much thinner than in the sessile spikelet, like the lemmas usually awnless.

Coarse perennial glabrous grasses with short rhizomes. *Culms* stout, more or less compressed below. Lower leaf-sheaths much compressed, flabellate, imbricate; blades firm to hard, conduplicate in the bud, then flattening out at least upwards, gradually passing into the sheath.

Vetiveria zizanioides (Linn.) Nash in Small, Fl. Southeast U. S. (1903) 67. Syn. *Andropogon squarrosus* Hook. f. (non Linn. f.) F. B. I. VII (1897) 186; *A. muricatus* Retz., Obs. Bot. III (1783) 43.

Culms stout, up to and over 2 m. high, from an aromatic rhizome, usually sheathed all along. *Leaf-blades* linear, acute, 30-90 cm. long, 4-20 mm. wide, erect, rigid, firm, or somewhat spongy, usually glabrous, rarely more or less hairy downwards on the upper surface, pale green; midrib slender; lateral nerves close; sheaths compressed, particularly the lower, which are sharply keeled, fan shaped, imbricate, very smooth, firm; ligules reduced to a scarious rim.

Panicle oblong, up to over 30 cm. long, usually contracted; rhachis stout, smooth; whorls 6-10 with up to 20 rays; branches oblique to sub-erect, filiform, slightly rough. *Racemes* 5 (rarely 7.5) cm. long, very slender; joints about as long as the sessile spikelets or sometimes distinctly exceeding them in length, smooth or more or less rough, minutely and unequally ciliate at the slightly oblique tips; pedicels similar but shorter. *Sessile spikelets* linear-lanceolate to almost linear, acute or sub-acute, 4-4.5 mm. long, yellowish, olive; violet-brown, or purplish to almost black; callus obtuse, less than 1 mm. long, glabrous. *Glumes* acute coriaceous; lower muriculate all over the back, 5-nerved; lateral nerves close, very fine; upper glume spinulosely muricate on the keel. *Lemma* of the lower floret as long as the glumes, acute, retrorsely ciliate. *Upper floret* hermaphrodite; lemma up to 3 mm. long, narrow oblong-lanceolate, mucronulate, eciliate. *Anthers* 2-3 mm. long. *Pedicelled spikelet* sparingly aculeolate or almost smooth; lemma of upper floret, entire, acute.

Mdlle. A. Camus, Bull. Mus. Paris (1919) 673, has two varieties both of which occur in Assam.

Spikelets muticous { Callus with short white hair. var. *genuina*.
 { Callus with yellow hair about
 { $\frac{1}{4}$ the length of the spikelet. var. *tonkinensis*.

This is the well-known khas-khas grass from which an oil, much used in perfumery, can be extracted.

A very common grass in the plains.

17. CHRYSOPOGON Trin.

Spikelets in threes at the ends of the branches of terminal panicles, one sessile the other two pedicelled, the two falling entire from the thickened, nearly always bearded, oblique tips of the peduncles; exceptionally 2-nate in 2-jointed racemes, one sessile and the other pedicelled, each sessile spikelet falling with the contiguous joint and its pedicelled companion, pedicels (and joints where any) linear, filiform, nerved, longitudinally grooved or appendaged. *Florets* 2; lower reduced to an empty lemma, upper hermaphrodite in the sessile, male or neuter in the pedicelled spikelet. *Sessile spikelets* usually laterally compressed, awned. *Glumes* subequal; lower coriaceous or chartaceous, involute with a rounded back, or complicate and more or less keeled upwards, upper boat-shaped, more or less keeled. *Lemmas* hyaline; of lower floret 2-nerved, of upper linear, entire or 2-dentate, with a usually perfect awn from the sinus. *Palea* 0 or small, hyaline, nerveless. *Lodicules* 2, small glabrous. *Stamens* 3; stigmas exerted laterally low down. *Caryopsis* linear, laterally compressed; embryo half the length of the grain. *Pedicelled spikelet* dorsally compressed, awnless or aristate.

Mostly perennial grasses. *Leaf-blades* narrow. Panicles usually lax, of whorls of simple or basally divided, filiform branches, rarely the branches 2-nate or solitary.

Key to the species of *Chrysopogon*.

Pedicels of the pedicelled spikelets glabrous :—

Base decumbent; panicle 2.5-10 cm. long,
 contracted; spikelets 2-4 mm. long. .. 1. *C. aciculatus*.

Base erect; caespitose grass, tall; leaves 12-35
 cm. long; spikelets 7-10 mm. long. .. 2. *C. gryllus*.

Pedicels of the pedicelled spikelets hairy :—

Spikelets 8-9 mm. long. .. 3. *C. orientalis*.

Spikelets 6-7 mm. long. .. 4. *C. lancearius*.

1. Chrysopogon aciculatus Trin., Fund. Agrost.
(1820) 188. Syn. *Andropogon aciculatus* Retz. Obs. V (1789)
22.

A perennial grass. *Rhizome* creeping, woody. *Culms* 20-60 cm. long; base rather slender, creeping, rooting and branching at the lower nodes, decumbent, finally ascending, glabrous even at the nodes. *Leaf-blades* rather close below, the upper spreading narrow, linear, rounded at the base, obtuse or acute, 2-15 cm. long, 3-5 mm. wide, those at the top very small, soft, the older leaves flat, often wavy at the margins, glaucescent, without hairs or with scattered hairs at the base, smooth; margins spinous; sheaths rounded, not auricled, narrow, glabrous or slightly bearded at the throat, the upper shorter than the internodes, the lower much longer; ligules membranous, narrow.

Inflorescence a panicle, erect, narrow, oblong or linear-oblong, spreading, 2.5-10 cm. long; principal axis robust, smooth, straight; branches 4-5-nate, fragile, slender, filiform, spreading, back convex not channelled, the longest 1-1.5 cm. long, all hairy, scabrid, and thickened at the top, articulating very obliquely with the hermaphrodite spikelets on only one joint, the same node carrying the hermaphrodite sessile and the two male or neuter pedicelled spikelets; articulation without an appendage; margins almost dilated, scabrid above. *Sessile spikelets* hermaphrodite linear, 2-4 mm. long, compressed dorsally, aristate; callus needle-shaped, narrowly incurved, decurrent on the pedicel, equaling the spikelet in length, glabrous, shortly hairy on the margins towards the insertion of the upper glume; hairs 1 mm. long. *Lower glume* 2-4 mm. long, papyraceous, linear-subulate, narrowly truncate and sometimes bimucronulate, involute at the base, broadly implicate towards the top, back convex, scabrid at the top, smooth at the base, obscurely 2-3-nerved; keels 2. *Upper glume* 2-4 mm. long, lanceolate-acuminate, shortly aristate, back sub-coriaceous, margins hyaline; keels aculeolate or scabrid-setulose at the top, glabrous. *Lower floret*; lemma 1.5-3 mm. long, hyaline, linear-oblong, somewhat obtuse or acute, 2-nerved; cilia retrorse. *Upper flower* hermaphrodite; lemma membranous,

linear-acuminate, glabrous or ciliolate at the top, entire and carrying a terminal not twisted awn which is scabrid and 4-8 mm. long; palea short, linear-obtuse, nerveless, glabrous. *Lodicules* cuneiform. *Stamens* 3; anthers scarcely 1 mm. long. *Caryopsis* linear. *Pedicelled spikelets* male, 5-6 mm. long, narrower than the sessile, subulate, lanceolate, glabrous; lower glume 5-6 mm. long, subulate, lanceolate, dorsally convex, keels ciliate at the summit, 3-nerved, terminating in an awn which is $\frac{1}{2}$ - $\frac{1}{3}$ the length of the glume; upper glume 4.5-5.6 mm. long, membranous, acuminate, back convex, 3-nerved, cilia retrorse. *Lower floret*; lemma shorter, hyaline, oblong-acuminate, cilia retrorse; palea small, cuspidate. *Upper floret*; lemma short, broad, cilia retrorse; palea linear-oblong, glabrous. *Anthers* 1.8-2 mm. long. *Pedicel* 1.5-3 mm. long, compressed, linear, glabrous, scaberulous, with thick hair below the spikelet.

Very common in plains and hills, especially in grazing grounds.

2. *Chrysopogon gryllus* Trin., Fund. Agrost. (1820)
188. Syn. *Andropogon gryllus* Linn., Cent. Pl. II. 33.

Perennial, densely caespitose; innovations extra-vaginal mixed with intravaginal. *Culms* erect simple, 6-160 cm. tall, terete or compressed, often scaberulous or rough above, now and then very glabrous, striate. *Leaves* 12-35 cm. long, 4-8 mm. wide, not distinct from the sheath, linear, acute, glabrous or hirsute, flaccid, bright green; margins very scabrid; sheaths of the innovations very compressed, dilated at the base, often with appressed hairs, those of the culms slightly compressed, carinate above, smooth or scaberulous, glabrous or hairy above; margins glabrous or ciliate; ligule a very narrow, ciliate, membranous ring.

Panicle 7.5-20 cm. long, branches whorled, 5-8 cm. long, usually many, tip of the branches obliquely truncate, densely bearded. Main axis angular, scabrid on the angles, axils bearded or glabrous. *Sessile spikelets* linear, callus straight acute, 7-10 mm. long; lower glume finally cartilaginous, coriaceous, shining, smooth or scaberulous; margins broadly involute, 7 mm. long; upper glume 7.25 mm. long, charta-

ceous, lanceolate, hyaline; margins ciliate; awn as long as the spikelet or shorter. *Lower floret*; lemma 5.5 mm. long, obtuse, nerveless; margins ciliate. *Upper floret* hermaphrodite; lemma as long as the lower lemma, minutely and auctely 2-toothed, 1-nerved, glabrous or ciliate; awn minute or up to 3.5 cm. long; palea small, oblong, obtuse, nerveless, glabrous; anthers 4 mm. long. *Pedicelled spikelets* rather longer than the sessile. linear lanceolate, usually of a violet colour; pedicels glabrous or ciliate; lower glume acuminate or aristulate, 5-9-nerved; keels ciliate above; upper glume lanceolate-acuminate, ciliate; lower lemma equal to the upper lemma 6-8 mm. long; palea as long.

Common in the hills 4-6,000 ft., usually in dry situations.

3. *Chrysopogon orientalis* A. Camus in Lecomte, Flor. Gen. de l'Indo-Chine VII (1922) 332. Syn. *Andropogon wightianus* Hook. f., F. B. I. VII (1897) 191.

A perennial grass. *Culms* 50-90 cm. tall, ascending, slender, branching or not, almost compressed, glabrous. *Leaf-blades* narrow, a little rounded at the base, distinct from the sheath, obtuse or almost so, 3-10 cm. long, 3-4 mm. wide, flat or rolled when mature, stiff, green, puberulous or glabrous, long fimbriate at the base; margins scabrid; sheaths of the innovations very compressed, with an almost bulbous base, often with appressed hairs, those of the culms somewhat compressed, carinate above, hairy or not at the top, smooth or scaberulous, tight, shorter than the internodes; ligule a rim of short hairs.

Inflorescence a decompound panicle, oblong, erect, 9-18 cm. long; main axis scaberulous, branches 4-12-nate, somewhat thickened at the top, scaberulous, fragile, with very oblique articulations; scar linear, oblong, ciliate. *Sessile spikelets*, hermaphrodite, linear, pale green or brownish, awned, often laterally compressed, 8-9 mm. long; callus acute, incurved, 3 mm. long, covered all over with reddish-rusty hairs 3.5 mm. long. *Lower glume* 8.8-5 mm. long, coriaceous, papyraceous, very obtuse, with a very glabrous back, convex towards the base, compressed above and hispid, margins glabrous and involute, 2 nerved; upper glume 8-9

mm. long, clasping at the base, coriaceous, margins hyaline, membranous, broadly oblong, hispidulous at the top and on the margins, back convex, 3-nerved; awn 12-15 mm. long, with a scarcely dilated base, covered with stiff spreading hairs. *Lower floret*; lemma 8-8.5 mm. long, linear-obtuse, nerveless, ciliate, cilia retrorse. *Upper floret*; lemma 8-9 mm. long gradually terminating in a subulate awn 5-6 mm. long, column golden yellow, white-hispid, flexuous; lodicules small, glabrous; stamens 3; anthers 4-5 mm. *Stigmas* yellowish. *Pedicelled spikelets* male, 10-12 mm. long, pale violet in colour, linear-lanceolate, dorsally compressed, often hispidulous; lower glume with 1-7 equal distant nerves, keel somewhat ciliate, awned; awn equal to the glume or longer; upper glume 3-nerved, ciliate; muticous or shortly aristate. *Lower floret*; lemma 2-nerved. *Upper floret*; lemma shorter than the upper glume, 1-nerved, hyaline, cilia retrorse; palea small. *Anthers* 4.5 mm. *Pedicel* 7-11.5 mm. linear-sub-claviform, with rigid cilia on the margins, reddish, 2-3 mm. long.

Not yet recorded but is likely to occur in the western districts.

4. *Chrysopogon lancearius* (Hook. f.) Haines, Bot. B. & O. (1924) 1036. Syn. *Andropogon lancearius* Hook. f., F. B. I. VII (1897) 190.

Perennial. *Culms* 120-180 cm. tall, compressed, with dry leaf-sheaths below, very leafy above, minutely downy below the panicle. *Leaf-blades* narrowly lanceolate, acuminate, narrowed towards the base, quite glabrous, flat, smooth, midrib broad, white above, nerves many; margins spinulose and sharp; sheaths imbricate, compressed, tight, striate, smooth and glabrous; ligule a row of very fine short hairs.

Inflorescence an oblong panicle 15-30 cm. long, many-rayed, with irregularly verticillate, capillary sub-erect branches, 5-10 cm. long, which exhibit the characteristic clavate, oblique, brown-bearded tips which are to be seen after the fall of the spikelet; pedicels compressed, somewhat translucent, bearded on each margin with long brown hairs, about 1-1.5 mm. long or longer. *Sessile spikelets* 6.25 mm. long; callus elongate, glabrous in front, pungent and with

a barb of brown hairs, shortly adnate to the oblique, brown-bearded tip of the peduncle. *Lower glume* conduplicate, tip oblique, 2-nerved on each side, slightly scaberulous on the nerves; upper as long but much broader, conduplicate, each side 1 mm. broad; keel rounded, 3-nerved, and broad membranous; margins pilose; awn 7.5-10 mm. long, slender. *Lower floret*; lemma 1 mm. long, reaching the tips of the anthers, ciliate. *Upper floret* hermaphrodite; lemma membranous, linear, not 2-fid but the sides meeting in front of the awn, which is 3.5 cm. long, short and hairy up to the knee, then slender and scabrid. *Pedicelled spikelet*; lower glume lanceolate, 8 mm. long, papyraceous, awned from the tip (awn 7 mm. long) 7-nerved, sparsely hairy on the median nerve dorsally, margins clasping the upper glume; upper glume lanceolate, membranous, 3-nerved, hairy on the nerves, ciliate on the inturned margins. *Lower floret* empty; lemma 5 mm. long, hyaline, ciliate on the margins, nerveless. *Upper floret* male; lemma linear-oblong, acute, 2-nerved, sparsely ciliate on the back and margins; palea lanceolate 1.5 mm. long, hyaline; stamens 3; anthers 3.5 mm. long; lodicules 2, cuneiform, glabrous.

GOALPARA and DARRANG.

18. CAPILLIPEDIUM Stapf.

Spikelets 2-nate, one sessile, the other pedicelled, similar in shape, differing in sex, in 1-2 (rarely up to 8-) jointed racemes at the ends of the capillary, primary and secondary and often tertiary or even quarternary, branches of a loose panicle; joints and pedicels finely filiform, longitudinally grooved and hyaline in the grooves, disarticulating horizontally; sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. *Florets* 2 in the sessile spikelet, lower reduced to an empty lemma or quite suppressed in the pedicelled spikelets, upper hermaphrodite, male or neuter in the pedicelled spikelets. *Sessile spikelet* dorsally compressed, awned; callus small, shortly bearded. *Glumes* equal, membranous to sub-herbaceous; lower 2-keeled with narrow inflexed margins; upper boat-shaped, 3-nerved, keeled, grooved on both sides of the obtuse keel.

Lemma of lower floret hyaline, nerveless, of the upper floret reduced to a hyaline linear stipe, firmer upwards, passing into a slender awn; palea absent. *Lodicules* 2, minute, glabrous. *Stamens* 3. *Stigmas* exerted laterally, longer than the styles. *Grain* oblong ellipsoid or oblong, dorsally slightly compressed; embryo exceeding half the length of the grain. *Pedicelled* spikelet awnless, lemma if present, nerveless, hyaline.

Annual or perennial grasses with slender culms, simple or branched, sometimes very copiously, frequently bearded at the nodes. *Leaf-blades* with a rather conspicuous white midrib. *Panicles* delicate, when much divided the branchlets at length more or less divergent.

Key to the species of *Capillipedium*.

Stems stout; robust grasses; peduncles of racemes not ciliate.

Lower glumes of sessile spikelets dorsally channelled, base of blades hardly narrowed; spikelets oblong obtuse.

1. *C. parviflorum*.

Lower glume of sessile spikelet flat; leaf-bases much narrowed and gradually tapering, spikelets lanceolate.

2. *C. assimile*.

Stems slender. peduncles pectinately ciliate. 3. *C. pteropechys*.

1. *Capillipedium parviflorum* Stapf in Dyer, Flor. Trop. Afr. IX (1917) 169. Syn. *Andropogon micranthus* Kunth, Revis. Gram. I. 165.

A perennial grass; innovation shoots extravaginal, thin; cataphylls more or less hairy, at length glabrescent. *Culms* tufted, to over 1 m. high, erect or shortly ascending at the base, simple or sparingly branched, terete, internodes sometimes channelled on the side facing the subtending leaf, glabrous. *Leaf-blades* linear from an often narrowed and slightly contracted base, long tapering to a fine point, up to almost 30 cm. long, 2.5 mm. broad, rather rigid and often spreading, flat, glabrous or more often pubescent all over to hirsute, particularly just above the ligule, margins rough, lateral nerves fine, 3-4 on each side.

Panicle oblong, 10-25 cm. long, 2.5-6 cm. wide, erect, more or less decompound, primary branches sub-verticillate,

often 5-7 or more from the lowest nodes, unequal, and divided from lower down and up to the 3rd degree, glabrous or hairy at the insertion, minutely puberulous all along, usually dark purple to almost black, ultimate branches (peduncles) 12-20 mm. long. Racemes reduced to 1 sessile and 2-pedicelled spikelets, or 2-rarely 3-jointed; joints and pedicels 1·8 mm. long, shortly ciliate or sometimes glabrous. *Sessile spikelet* oblong, 2·8-5 mm. long, usually dark purplish or reddish to olive-brown. *Glumes* more or less membranous, lower minutely truncate, very shallowly concave along the middle on the back, about 6-nerved (2 intercarinal), scabrid all over, ciliate upwards on the keels; upper scaberulous upwards on the keel. *Lemma* of lower floret 2·2-5 mm. long; awn including stipe 1·25-1·9 cm. long, fine. *Anthers* 1·6-1·8 mm. long. *Pedicelled spikelet* usually male, very similar to the sessile or somewhat smaller, narrower and paler. *Lower glume* acute, 7-nerved; keels ciliolate upwards. *Upper floret* suppressed.

Rather uncommon, KHASI and NAGA HILLS, 4-6,000 ft.

2. *Capillipedium assimile* *A Camus* in Lecomte, Flor. Gen. de l'Indo-Chine VII. 314. Syn. *Andropogon assimilis* Steud., Syn. Pl. Glum. (1854) 397.

Perennial. *Culms* 1·8-3·5 m. tall, suffrutescent, decumbent and rooting at the base, branching, internodes very glabrous, round but flattened on one side, nodes pubescent, branches spreading. *Leaf-blades* flat, almost lanceolate, linear, base very narrow, insensibly acuminate-setaceous, 6-15 cm. long, 3-6 mm. broad, flat, spreading, soft, glabrous or hispidulous, often scaberulous, with the margins spinous toothed, median nerve somewhat thick, broad and white above; sheaths somewhat compressed, subcarinate, the lower slipping from the culm, all shortly bearded in the throat, nodes sometimes hairy, smooth or scaberulous; ligules short, truncate, ciliolate or hairy.

Inflorescence a decompound panicle 5-12 cm. long, slender, erect, ovate oblong or triangular, branched to the 3rd degree; common axis slender; branches and branchlets capillary, spreading at a right angle after anthesis, bearded

in the axils, naked at the base; the primary solitary rarely opposed, the secondary numerous; racemes 7-10 mm. long, peduncled, 2-3 jointed; rhachis smooth, fragile; joints and pedicels 1.5-2.5 mm. long, filiform, back deeply channelled, hyaline; margins ciliate or glabrescent; hairs .75-1.25 mm. long, often absent at the top; articulations without appendages. *Sessile spikelets* linear-oblong, 2-3.5 mm. long, all hermaphrodite, dorsally compressed, pale green or reddish, aristate; lower glume membranous, oblong or linear-oblong, margins narrow inflexed, 2-keeled, very narrowly truncate at the top, somewhat depressed on the back, towards the top glabrescent, with stiff cilia on the keels, delicately 2-5-nerved; callus small, shortly bearded; upper glume 2-3.5 mm. long, broadly lanceolate and ciliolate at the apex, acute or mucronate, sub-depressed towards the obtuse keel, margins glabrous, 3-nerved. *Lower floret* barren; lemma .75-1.25 mm. long, hyaline, ovate, obtuse, nerveless, glabrous. *Upper floret* hermaphrodite; lemma .75-1.2 mm. long, narrow, glabrous; awn very slender .6-12 mm. long; palea absent. *Lodicules* glabrous. *Stigmas* oblong, broadly plumose, almost twice as long as the styles. *Pedicelled spikelets* male or neuter, 3.5 mm. long, linear-lanceolate, rusty; lower glume linear-lanceolate, acute, green or reddish, keel ciliolate, the remainder glabrous, 7-nerved; upper glume 3.5 mm. acute 3-5-nerved, ciliolate. *Lower floret* barren; lemma shorter, oblong, obtuse, nerveless, glabrous. *Upper floret*; lemma absent. *Anthers* 1.2 mm. long, stamens scarcely absent.

I have followed Mlle. Camus in Flore Generale de l'Indo-Chine rather than Stapf in Hook. Icon. Plant. tab. 3085, who calls this plant *C. glaucopsis*.

A very common grass up to 6000 ft.

3. Capillipedium pteropechys (Clarke) Stapf in Hook. Ic., Plant. sub tab. 3085. Syn. Andropogon pteropechys Clarke in Jour. Linn. Soc. XXV (1889) 88. t. 38.

Perennial. *Culms* very slender from a creeping root-stock, stout, 40-60 cm. high, terete, glabrous and smooth, finely striate, nodes bearded, sparingly branched or simple. *Leaf-*

blades 7.5-15 cm. long, linear-lanceolate, finely acuminate, narrowed towards the base, glabrous above, below sparsely hairy from tubercled bases, scaberulous on the upper surface, margins scarcely thickened, scabrid, midrib definite above as a white line; sheaths rather loose below, close and tightly fitting above, striate, smooth and glabrous, except for a few hairs at the collar and a few at the mouth; ligule a very narrow, ciliate rim; cilia stiff.

Inflorescence a very open panicle 5-7.5 cm. long, sparingly branched; branches filiform, smooth and glabrous except just below the lowest spikelet where they are pectinately ciliate; hairs white. *Racemes* usually few-spiculate, about 1 cm. long, joints and pedicels ciliate on the margins, channelled, usually about half the length of the spikelet. *Spikelets* oblong, somewhat obtuse, erect; callus hairs equaling $\frac{1}{4}$ the length of the spikelet. *Sessile spikelets* 3.75-4.25 mm. long; lower glume oblong-obtuse, more or less rounded on the back, quite glabrous, keels pectinately ciliate, 9-nerved, nerves usually prominent; upper glume ovate-lanceolate, acute, 3-nerved, sparingly ciliate. *Lower floret* barren; lemma small, ovate, nerveless; palea absent. *Upper floret* hermaphrodite; lemma the linear base of an awn 1.5 cm. or more long; palea very small or absent. *Pedicelled spikelets* male or barren, rather narrower than the sessile and more acute; lower glume 9-11-nerved; upper glume thin membranous, 3-nerved; lemma oblong obtuse, glabrous and nerveless; anthers 2 mm. long.

This grass has, so far as I am aware, been only collected thrice: by C. B. Clarke on the Pulebadze-Japvo ridge about 8,500 ft. and by me in the same place and also at Purr, in the Sangtam country, at, 6,000 ft.

19. BOTHRIOCHLOA O. Kuntze.

Spikelets 2-nate, one sessile and the other pedicelled, similar in shape or the pedicelled reduced and smaller, the latter always different in sex except sometimes the lowermost pair which may be homogamous (male or neuter), on the fragile rhachis of many jointed, shortly peduncled, sub-digi-

tate or paniced racemes; joints and pedicels filiform longitudinally grooved and hyaline in the groove, disarticulating horizontally; sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. *Florets* 2 in the sessile spikelets, lower reduced to an empty lemma, upper hermaphrodite, 2 or 1 in the pedicelled spikelet, the lower male or neuter, the upper neuter or usually quite suppressed. *Sessile spikelet* dorsally compressed, awned; callus small, shortly bearded. *Glumes* equal, thinly chartaceous to membranous; lower 2-keeled, with narrow sharply inflexed margins; upper boat-shaped, 3-nerved, acutely keeled. *Lemma* of lower floret hyaline, nerveless, of the upper floret reduced to a hyaline linear stipe, firmer upwards passing into a slender awn. *Palea* absent or very minute. *Lodicules* 2, minute, glabrous. *Stamens* 3. *Stigmas* exerted laterally usually low down, longer than the styles. *Caryopsis* oblong, obtuse, dorsally slightly compressed; embryo about half the length of the grain. *Pedicelled* spikelet awnless, lemmas (if present) hyaline, nerveless.

Perennial grasses with slender, simple or branched culms, bearded or beardless at the nodes. *Panicles* mostly sub-digitate with a short primary axis, rarely the racemes in branches of the second order; racemes always shortly peduncled. *Spikelets* small.

The genus *Bothriochloa* was published by Dr. Otto Kuntze in *Revisio Generum Plantarum* II. (1891) 762. In spite of the fact that Kuntze confines his genus to species "inflorescentia racemoso paniculata (haud racemoso digitata) *Amphilophis pertusa* Stapf (*Andropogon pertusus* Willd.) has been transferred to this genus as it is obviously very closely allied to the other species with a paniculate inflorescence.

Key to the species of *Bothriochloa*.

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|---|---------------------------|
| Primary axis elongated, much longer than the lowest racemes, lower branches or at least the stronger sparingly divided, but not beyond the second degree. | 1. <i>B. intermedia</i> . |
| Primary axis short, much overtopped by the racemes. Lower glumes of sessile spikelets with or without pits and hairy below. | 2.. <i>B. pertusa</i> . |

1. *Bothriochloa intermedia* (R. Br.) A. Camus in Ann. Soc. Linn. Lyon, (1930) n. s. LXXVI (1931) 164. Syn. *Andropogon intermedius* R. Br. Prod. (1810) 202.

Perennial; rhizome very short, hard; innovations extravaginal; cataphylls ovate to lanceolate, acute, hard, smooth. *Culms* tufted, erect or shortly ascending to over 1 m. in height, terete, rather stout below, glabrous, 5-7-noded, simple or very sparingly branched. *Leaf-blades* linear, long tapering to a setaceous point, not or slightly contracted at the base, up to 30 cm. long, 6 mm. wide, pale green, glabrous, or rarely with soft white spreading hairs above the ligule, smooth except on the margins; sheaths terete, glabrous, smooth; nodes glabrous or the upper bearded; ligules truncate, very short, scarious.

Panicle narrowly oblong, 10-23 cm. long by 2.5-4 cm. broad, erect, primary axis much longer than the lowest racemes, somewhat stout, and when mature stiff, shortly bearded at the branch-axils, otherwise glabrous and smooth; branches whorled, up to 6 in a whorl, or semi-verticillate, or 2-nate or solitary from the weaker nodes, straight, 2.5-7.5 cm. long, the longer divided from 1.5 cm. above the base, from 3-7-noded, secondary branches simple. *Racemes* 1.25-3.75 cm. long, straight or flexuous, usually purplish, inconspicuously white-villous; joints and pedicels 2-3 mm. long, ciliate; uppermost cilia much longer than the rest, up to 1 mm. long. *Sessile spikelet* pale green or purplish throughout, including the small, minutely bearded callus 3-3.5 mm. long. *Glumes* equal; lower truncate, slightly concave on the back, chartaceous membranous, hairy below the middle, more rarely glabrous, keels rigidly ciliate upwards, intracarinal nerves 4-5, very fine, evanescent upwards, with or without a pit in the middle; *upper-glume* lanceolate, acute, 3-nerved, keel scabrid upwards; margins sparingly ciliate. *Lemma* of lower floret oblong, 2.5 mm. long, hyaline, nerveless, ciliate, awn of upper floret 6-12 mm. long, brown below, pale above the bend. *Pedicelled spikelet* neuter, mostly reduced to the glumes, narrowly linear-oblong to linear, 2.5-2.75 mm. long, glabrous, of the same colour as the sessile. *Lower glume* rigidly and minutely ciliate, 5-9-

nerved, often rolled and not pitted; upper hyaline, nerveless often minute.

Common in the plains.

Bothriochloa intermedia (R. Br.) *A. Camus* forma *punctata* A. Camus.

This is the variety of this grass with a pitted lower glume in the sessile spikelet.

KHASI and JAINTIA HILLS, 4-6,000 ft.

2. Bothriochloa pertusa (Willd.) *A. Camus* in Ann. Soc. Linn. Lyon, (1930) n. s. LXXVI (1931) 164. Syn. *Andropogon pertusus* Willd., Sp. Pl. IV, 922.

Perennial; rhizome short, innovations extra- or more often intravaginal; cataphylls glabrous. *Culms* slender, terete, many noded, sub-erect or geniculately ascending or often weak, trailing or rambling over the ground, rooting and throwing up tufted or single shoots from the nodes, glabrous. *Leaf-blades* linear, tapering to a fine point, hardly contracted at the base, 15 cm. long by 3-4 mm. wide, glabrous, pubescent or hirsute, often with tubercle based hairs; sheaths of the innovation shoots compressed, more or less keeled, the others terete, glabrous, smooth, usually bearded at the nodes; ligules very short, truncate, of lower leaves up to 2 mm. long, rounded, membranous, ciliolate.

Panicle sub-digitate, about 5 cm. long; primary axis filiform, 1.25-2.5 cm. long; branches opposite or solitary, rarely in scanty whorls, naked for 4 (rarely 6) mm., simple, glabrous, smooth. *Racemes* 3-6 cm. long, often flexuous, pale or dull purplish, whitish, silkily villous; joints and pedicels very similar, not much over 2 mm. long; ciliate, cilia much longer at the tip, (of the pedicels up to 3 mm. long). *Sessile spikelet* oblong, pale greenish, including the shortly bearded callus, 3-4 mm. long, beard up to 2 mm. long. *Glumes* equal; lower very minutely truncate, flat on the back, chartaceous-membranous, hairy below the middle, keels rigidly ciliolate upwards, intracarinal nerves 5-7 or more upwards, pit always present, usually very pronounced, corresponding to a firm bulb-like protuberance on the inner side; *upper glume* lanceolate, acute or mucronulate, 3-nerved, keel scaberulous,

margins ciliate upwards. *Lemma* of lower floret oblong, obtuse not much over 2 mm. long, hyaline, nerveless, minutely ciliolate at the top; awn of upper floret including the stipe, 12-20 mm. long. *Pedicelled spikelet* male or neuter, very like the sessile in shape and size, but usually darker. *Glumes* sub-equal, lower not pitted, about 7-nerved. *Lemma* like that of the sessile spikelet or more or less reduced. *Stamens* 3, anthers up to 1.5 mm. long, rarely absent.

NAGA HILLS 4,000 ft. but doubtless occurs in all districts.

20. DICHANTHIUM Willemet.

Spikelets 2-nate, one sessile, the other pedicelled, similar in shape, different in sex, except the lowermost 1 or 2 pairs of each raceme, which are (with occasional exceptions) homogamous (male or neuter) in many-jointed, shortly peduncled, sub-digitate, rarely sub-panicled or racemosely arranged racemes; joints and pedicels filiform, solid, disarticulating sub-horizontally except the lowest barren pairs; fertile sessile and pedicelled spikelets deciduous, the former with the adjacent joint and pedicel. *Florets* two in the sessile fertile spikelets (lower reduced to an empty lemma, upper hemaphrodite), one in the barren sessile and all the pedicelled spikelets, male or neuter, or suppressed. *Sessile spikelet* dorsally compressed, awned (except the basal homogamous ones); callus small, shortly bearded. *Glumes* equal, thinly chartaceous; lower usually very obtuse, 2-keeled with narrow, sharply inflexed margins; upper boat-shaped, 3-nerved, acutely keeled. *Lemma* of the lower floret hyaline, nerveless, of the upper floret reduced to a hyaline, upwards firmer, linear stipe, passing into a slender awn (very rarely finely 2-toothed, with the awn from the sinus). *Palea* absent or minute. *Lodicules* 2, minute, glabrous. *Stamens* 3. *Stigmas* exerted laterally or above the middle or near the tips. *Caryopsis* oblong, obtuse, dorsally compressed; embryo rather more than half the length of the grain. *Pedicelled spikelet* awnless; lemma, if present, hyaline, nerveless.

Perennial, very rarely annual, grasses with simple branched usually many-noded culms, bearded or beardless at the nodes. *Panicles* usually sub-digitate with a short or

very short primary axis, rarely the latter elongated; racemes always shortly peduncled. *Spikelets* small, rarely the male somewhat larger.

Key to the species of *Dichanthium*.

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| Lower glume of the sessile spikelets obovate or oblong-truncate, winged, no median nerve; sheaths compressed; ligule a short ciliate membrane. | | 1. <i>D. caricosum</i> . |
| Lower glume of the sessile spikelet oblong, obtuse or truncate; keel not winged, with a median nerve; sheaths terete; ligule membranous large. | .. .. . | 2. <i>D. annulatum</i> . |

1. *Dichanthium caricosum* *A. Camus* in Bull. Mus. Nat. Hist. Paris, XXVII, (1921) 549. Syn. *Andropogon caricosus* Linn., Sp. Pl. ed. 2, 1480.

A perennial grass; innovations often stoloniferous. *Culms* 30-60 cm. high, rooting at the nodes, geniculate-ascending, compressed, channelled on the surface corresponding to the back of the sheaths, very glabrous or with hairy nodes, simple or branched. *Leaf-blades* somewhat rigid, flat, narrowly linear, base rounded, setaceous-acuminate, green, 15-20 cm. long, 2.5-5 mm. broad, glabrous, almost smooth; margins scaberulous; median nerve keeled, broad and white above; sheaths somewhat loose, compressed, keeled, shorter than the internodes, throat not auricled, not spathiform; ligules very short, truncate, membranous, glabrous or ciliate.

Inflorescence of spiciform racemes which are either solitary, sub-digitate or falsely paniced, 2-4-nate, rather thick, silky, erect or flexuous and nodding, pale green, 2.5-10 cm. long; peduncle 5-15 mm. long; rhachis of the racemes many-jointed, rather fragile, joints and pedicels 1.3-1.6 mm. long, linear, filiform, back flat, margins with hairs, articulations oblique, without appendages; spikelets almost distichous, imbricate, the sessile of the lower 1-3 pairs different from the upper, male or empty, persistent. *Sessile spikelets* hermaphrodite, 4-5 mm. long, obovate-elliptic or obovate-oblong, rather narrow, compressed dorsally; lower glume thin, herbaceous-papyraceous, obovate or oblong, very

or hardly obtuse, sub-truncate denticulate, margins narrowly keeled and inflexed at the top, a little inturned at the base; margins silky with stiff cilia; back convex, glabrous and shining, 8-12-nerved, (no median nerve); nerves evanescent below the top; callus very short, broad, very shortly bearded; upper glume 4-5 mm. long, much narrower than the lower, inflexed, membranous-papyraceous, ovate-oblong, obtuse or somewhat acute, muticous, 3-keeled, depressed near the median keel. *Lower floret* barren; lemma 3.5-4.5 mm. long, hyaline, oblong, obtuse, nerveless, glabrous or ciliate. *Upper floret* hermaphrodite; lemma entire, narrow, awned; awn slender, 15-25 mm. long; column brownish, very scabrid, kneed in the middle. *Lodicules* glabrous, cuneiform. *Stamens* 3; anthers 2-3 mm. long, linear. *Ovary* glabrous, stigmas oblong. *Caryopsis* obovate-oblong, compressed on the ventral face, convex on the dorsal surface. *Pedicelled spikelets* male, 4-5 mm. long; resembling the sessile but flatter, hairier and more obtuse, broad, obovate, sub-claviform; pedicels linear, filiform, dorsally flattened, compressed; lower glume broadly oblong, silky, 15-19-nerved, keels and nerves rather longer ciliate; upper glume elliptic or ovate-lanceolate, acute, shorter than that of the sessile spikelets, margins broadly inflexed, ciliate. *Lower floret*; lemma 2.5-3.5 mm. long, linear, oblong, acute, muticous, glabrous; anthers 2 mm.

Banks of the Brahmaputra in Lakhimpur.

2. **Dichanthium annulatum** Stapf Flor. Trop. Afr. IX. 178. Syn. *Andropogon annulatus* Forsk., Flor. Aeg. Arab. (1775) 173.

A densely caespitose perennial. *Culms* .5-1 m. tall, erect or geniculate ascending, rather robust, often woody at the base, very leafy, smooth, nodes alternately flattened, simple or sparingly branchy. *Leaves* narrow, linear, setaceous-acuminate, flat, rigid, glaucous, papillose, scabrid at least on the upper surface, margins scabrid, glabrous or with appressed hairs above, 5-30 cm. long, 3-6 mm. broad; sheaths rounded, sub-carinate at the top, narrow, striate, very glabrous; nodes with spreading or deflexed hairs; ligules oblong,

2-4 mm. long, obtuse, membranous, decurrent into the sheaths, glabrous.

Spiciform racemes solitary or 2-4-nate, sometimes 8-15, sub-digitate and paniced, almost equal, slender straight or flexuous, often nodding, 3-6 cm. long, soft, whitish, green or streaked with violet, sometimes branchy; common axis very glabrous, nodes bearded, alternate or opposite, peduncle very glabrous 4-10 mm. long; rhachis of the racemes many jointed; joints of the rhachis and pedicels 1.5-2.5 mm. long, linear-filiform, back flat, without a longitudinal furrow, hairy on both sides, with a fascicle of short hairs at the base; articulations oblique, without appendage. *Sessile spikelets* hermaphrodite, 3-5 mm. long, ovate-oblong or oblong-concave, compressed, dorsally awned (lower different from the upper). *Lower glume* papyraceous, ovate-oblong or oblong, obtuse or hardly truncate, margins narrowly keeled or inflexed, compressed dorsally, keel spinulosely ciliate, the rest with scattered spreading hairs or glabrous, 5-9-nerved, (nerves evanescent below the top) narrowly clasping the upper glume. *Upper glume* 3-5 mm. long, narrow, lanceolate, slightly acute or obtuse, muticous, 3-keeled, depressed towards the central keel, 3-nerved, smooth except at the base, glabrous or ciliate. *Lower floret* barren; lemma 2.8-3.3 mm. long, hyaline, linear-oblong, obtuse, nerveless, glabrous. *Upper floret* hermaphrodite; lemma 2.8-3.3 mm. long, rather thick, very narrow, entire; awn 16-24 mm. long, slender, column chesnut, scabrous, more or less distinctly kneed. *Stamens* 3; 1.75 mm. long. *Ovary* glabrous. *Caryopsis* obovate oblong, compressed, flat on the ventral surface, convex dorsally. *Pedicelled spikelets* male or neuter, equalling or exceeding the sessile but rather more flattened; lower glume obtuse or acute, margin ciliate, 7-11-nerved; upper glume equalling the lower, narrower, lanceolate, obtuse, 3-nerved, ciliate. *Lower floret*; lemma very obtuse, ciliate, 2.75 mm. long. *Upper floret*; lemma small or almost absent, muticous; in the neuter spikelets the lemma smaller.

Considered to be an excellent desert fodder in Africa. Common in the plains and foothills.

21. ARTHRAXON P. Beauv.

Spikelets solitary at each node of the rhachis or 2-nate, one pedicelled, muticous, rarely developed and male, often neuter, sometimes reduced to the pedicel, more or less aborted, the other sessile, 2-flowered, hermaphrodite, very often awned, often laterally compressed, finally falling with the contiguous joint of the rhachis. *Lower glume* large, with infolded margins or not, often mucronate, tubercular, muticous, not embracing the upper glume. *Upper glume* narrow, lanceolate, keeled, muticous or mucronate, 3-nerved. *Lower floret* neuter; lemma hyaline. *Upper floret* hermaphrodite; lemma shorter than that of the lower floret and firm at the base, entire or 2-toothed; an awn arises from the dorsal surface just above the base; awn slender, often perfect, sometimes reduced to a mucro; palea small or absent. *Lodicules* 2, small, truncate, cuneiform. *Stamens* 1-3. *Styles* short or absent; stigmas longer than the styles, exerted towards the base of the spikelet. *Caryopsis* narrowly linear or fusiform, rounded, a little obtuse; embryo half the length of the caryopsis.

Slender herbs, often branched. *Culms* decumbent. *Leaves* large, sometimes short, cordate-amplexicaul or ovate-lanceolate. *Inflorescence* of two to many racemes, digitate, fasciculate or sub-panicled at the top of the culm and of its branches. *Rhachis* very slender, fragile at the articulations.

Key to the species of *Arthraxon*.

Stamens 3 :—

Pedicelled spikelets male; sessile spikelets more or less dorsally compressed :—

Perennial with ovate, densely tomentose innovation buds.

1. *A. lanceolatus*.

Annual with slender, prostrate or ascending rooting bases.

2. *A. echinatus*.

Pedicelled spikelets quite suppressed, pedicels present :—

Anthers about as long as the spikelet :—

Common peduncle pubescent.

3. *A. rudis*.

Common peduncle glabrous.

4. *A. breviaristatus*.

Anthers minute, rhachis capillary, sparsely hairy.

5. *A. nudus*.

Stamens 2 :—

Pedicelled spikelets suppressed, pedicels more or less reduced or almost completely suppressed.

.. 6. *A. hispidus*.

Pedicelled spikelets usually present at upper nodes of the racemes, sometimes at lower, neuter, usually much reduced, pedicels distinctly developed, like the joints conspicuously ciliate; lower glume 2-dentate.

.. 7. *A. lancifolius*.

1. *Arthraxon lanceolatus* Hochst., Flora (1856) 188.
Syn. *Andropogon lanceolatus* Roxb., Flor. Ind. I. 257.

A perennial grass. *Rhizome* at the time of flowering with ovate buds densely covered with fulvous hair. *Culms* 40-80 cm. high, slender, decumbent, creeping, rooting at the lower nodes, very glabrous or scaberulous on the lower nodes, shortly bare at the top, flowering branches solitary or 2-nate, or sub-fastigiate, rarely simple. *Leaf-blades* ovate-lanceolate to linear-lanceolate, up to 9 cm. long by 5-15 mm. broad, green or glaucous, thin or firm, spinulose along the margins; base cordate amplexicaul, many nerved, slender; sheaths rather lax, striate, glabrous or hirsute with tubercle-based hairs; outer margins often ciliate smooth or rough; ligule up to 3.5 mm. long, decurrent into the sheath, membranous, glabrous or ciliate.

Racemes few or many, 1.5-5 cm. long, rhachis sparsely hairy, joints about half as long as the spikelets, margins ciliate. *Sessile spikelets* linear-lanceolate, 6-7 mm. long, with a shortly puberulous callus. *Lower glume* coriaceous-chartaceous, attenuate from the middle, acute, with the apex entire or minutely 2-toothed, 5-7-nerved; dorsal surface convex, sometimes glabrous, sometimes muriculate. *Upper glume* lanceolate, acuminate or mucronulate, 3-nerved, glabrous or ciliate. *Lower floret*; lemma linear-oblong, acute, glabrous. *Upper floret*; lemma hyaline, awn from the base up to 2.6 cm. long or less. *Stigmas* broadly oblong, 2.5-3 mm. long, much longer than the styles. *Pedicelled spikelets* linear-lanceolate, keels hispidulous, male; stamens 3; anthers 2.5-3 mm. long.

In a manuscript Stapf distinguishes 2 varieties of this plant.

- A. Blades ovate-lanceolate, glaucous, firm, ratio of length to breadth mostly 4·3:1 rarely 5:1.
B. Blades lanceolate to linear-lanceolate, green rather thin, ratio of length to breadth mostly 7·8:1 rarely 5:1 or up to 15:1.
He called the latter var. *angustus*.

2. Arthraxon echinatus Hochst. in Flora (1856) 188.

An annual grass. *Culms* slender up to 30 cm. tall, branched. *Leaf-blades* linear or oblong-lanceolate, up to 6 cm. long, 5·1·25 cm. wide, usually pubescent, often ciliate on the rounded base, flaccid; sheaths striate, sparsely hairy; ligule short.

Racemes just emerging from the spatheate sheath, very pale, 8·1·25 cm. long; joints and pedicels 2·5 mm. long, ciliate. *Spikelets* geminate, one sessile, one pedicelled, 5 mm. long or a little longer. *Sessile spikelet* 5 mm. long; lower glume as long as the spikelet; nerves on the back of the glume echinulate; lower spikelets rarely smooth; upper glume keeled, scabrid near the top, 3-nerved. *Lower floret* neuter; lemma shorter than the glumes, hyaline. *Upper floret* hermaphrodite; lemma 3 mm. long; awned just above the base; awn 6·8 mm. long. *Anthers* half as long as the lemma.

KHASI and NAGA HILLS, 4·7,000 ft.

3. Arthraxon rudis Hochst. in Flora (1856) 188.

A perennial grass. *Culms* 7·1·1 m. tall, rigid, erect, geniculate at the base, rooting, branchy, slender, pubescent above, striate, often with flowering branches at the basal nodes; nodes glabrous. *Leaf-blades* oblong-lanceolate, or ovate-lanceolate, with a cordate amplexicaul base, acuminate, 6·10 cm. long, 8·18 mm. broad, spaced, thin, scabrid, pubescent or glabrous below; margins scabrid, sometimes pectinate scabrid, ciliate or spinulose towards the base; median nerve slender, scabrid below; sheaths somewhat lax, with tubercle-based hairs at the summit only; throat shortly auricled; ligules membranous, rounded, fringed, 1·2 mm. long.

The peduncle of the inflorescence is exserted, densely whitish pubescent; racemes 2·8, 1·25·2·5 cm. long, the lower branched, the upper simple, seated on peduncles which are

pubescent, from .5-2 cm. long; rhachis very slender, fragile; joints shortly ciliate, 4-6 mm. long. *Sessile spikelets* somewhat distant, in profile sub-obliquely lanceolate, or almost ovate-lanceolate, 6-8 mm. long, glabrous save on the callus, of a livid green, then brownish; callus very short, with dense hairs 1 mm. long. *Lower glume* coriaceous, very shortly hyaline at the top, broadly lanceolate, very attenuate in the upper two-thirds, acuminate, entire, margins narrowly inflexed, 7-9-nerved, all the nerves, or only the marginal with tubercular spines. *Upper glume* 6-8 mm. long, coriaceous, papyraceous, top hyaline, acute, keel scabrid or aculeolate, 3-nerved. *Lower floret*; lemma 4.5-6 mm. long, lanceolate, acute, ciliolate, margins infolded, 3-nerved. *Upper floret*; lemma hyaline at the apex, membranous at the base, oblong, entire or bifid at the top; awn sub-basal, 10-14 mm. long; palea very short, hyaline, ovate, top dentate, ciliate. *Stamens* 3; anthers 1.5-2.5 mm. long. *Stigmas* 1.5 mm. long, equalling the styles. *Pedicelled* spikelets absent; pedicel $1/3$ the length of the sessile spikelet, acute, sparsely ciliate.

Not common; plains to 3,000 ft.

Mr. V. Narayanaswami, Botanical Survey of India, has drawn my attention to the fact that Hooker's description of *Arthraxon rudis* Hochst. in F.B.I. VII (1897) 144 is to a large extent taken from Griffith's description of *Andropogon castratus* Griff. in Not. III, (1851) 89, and that he refers to this plant in his synonymy and also to Wallichian sheet No. 8837. This latter sheet is undoubtedly the *Arthraxon rudis* of Hochstetter who, incidentally, also refers to this sheet in Flora (1856) 188. It is not known to me if Griffith's sheet is in existence but the description of *Andropogon castratus* Griff. was published in 1852 and so the epithet "*castratus*" has priority over "*rudis*" (1856) Mr. Narayanaswami has made the new combination *Arthraxon castratus* (Griff.) Narayanaswami in MSS.

4. *Arthraxon breviaristatus* Hack., Mon. Androp. (1889) 350.

A perennial grass. *Culms* ascending from a decumbent rooting and branched base, .5-1 m. tall, rooting at the nodes, slender, very smooth, short noded below, terete, smooth and glabrous. *Leaves* ovate or broadly ovate-lanceolate, with a cordate amplexicaul base, 2-5 cm. long, 10-12 mm. broad, tip acuminate, with a few evanescent hairs with tubercular

bases at the throat; sheaths somewhat lax with long cilia from tubercle bases in the throat, striate, with scattered tubercle-based hairs at the top; margins densely ciliate with stiff hairs; nodes bearded or not; ligules a narrow membranous ring, convex upwards, densely ciliate.

Peduncle of the *inflorescence* long exserted; racemes 6-10, shortly peduncled, 3-7 cm. long, glabrous, violet-mauve; joints of the rhachis with a straight disarticulation, angled, minutely scabrid, shortly ciliate or glabrous below and ciliate above. *Sessile spikelets* ovate-lanceolate, 4·5-5·5 mm. long, callus glabrous. *Lower glume* papyraceous, oblong-lanceolate, sub-acute, convex, margins not inflexed, 7-9-nerved, long spiny towards the margins; short spines in the middle and at the base, tubercular at the base. *Upper glume* 4-5 mm. long, almost papyraceous, linear-acute, or mucronate; keel acute, ciliate, 3-nerved; margins hyaline ciliate. *Lower floret*; lemma 3-3·5 mm. long, linear-obtuse, glabrous. *Upper floret*; lemma 4·25-5·25 mm. long; awn almost basal, 6-8 mm. long, shortly exserted. *Stamens* 3 rarely 2. *Anthers* 3 mm. long. *Stigmas* 3 mm., twice as long as the styles.

5. *Arthraxon nudus* Hochst. in Flora (1856) 188.

An annual grass. *Culms* 30-60 cm. tall from a prostrate, widely rambling and rooting base, lower nodes sending down many fibrous roots, rarely all the nodes flower bearing, smooth, and glabrous. *Leaf-blades* ovate-acuminate, base cordate amplexicaul, firm or rather flaccid in shady places, smooth above and rough below, midrib rather prominent on the lower surface often with a few spaced hairs, margins scarcely thickened, long ciliate from tubercle bases, 3-8 cm. long, 1·5-2 cm. broad; sheaths terete, smooth, striate, or with hirsute tubercle-based hairs especially towards the collar, outer margin ciliate; ligules 2 mm. long, membranous, decurrent into the sheaths.

Racemes many, shortly exserted or spathaceously sheathed. *Spikelets* linear-lanceolate in profile, very slightly oblique, 3 mm. long; callus naked; rudimentary pedicels only half the length of the sessile spikelet; joints of the racemes and pedicels glabrous. *Lower glume* lanceolate, 7-

10-nerved, without muriculations except on the outer nerves. *Upper glume* papyraceous, membranous, compressed, scabrid on the upper 1/3 of the keel, 3-nerved. *Lower floret*; lemma lanceolate hyaline, 2 mm. long. *Upper floret*; lemma 2 mm. long, lanceolate, hyaline, glabrous, awned from near the base; awn 8 mm. long. *Pedicelled spikelets* missing, pedicel 1.5 mm. long.

6. *Arthraxon hispidus*. (Thunb.) Makino in Bot. Mag. Tokyo XXVI (1912) 214. A ciliaris P. Beauv., Agrost. (1812) 111 (in part). Based on *Phalaris hispida* Thunb., Flor. Jap. (1784) 44.

An annual. *Culms* densely tufted, creeping and rambling over the ground, finally ascending, short or tall, leafy to the panicle. *Leaves* ovate or lanceolate, acute or acuminate, rigid or flaccid in shade, sparsely hairy on both surfaces with short white hairs from tubercle-bases, distantly ciliate on the rounded margins at the base; sheaths glabrous, smooth, striate, ciliate on one margin, rather loose or inflated; ligules ciliate, membranous, lacerate, 1 mm. long.

The inflorescence emerges from the sheath of the uppermost leaf which is furnished with a rudimentary blade, and consists of several spikes 2.5-3 cm. long; pedicels completely suppressed or reduced to a mere point; joints of the rhachis 2.5 mm. long, ciliate, curved. *Spikelets* solitary on the nodes of the rhachis, 3 mm. long, dimidiate-lanceolate. *Lower glume* 3 mm. long, convex on the back, very scabrid, especially towards the apex. *Upper glume* keeled, scabrid towards the top. *Lower floret* empty; lemma usually absent. *Upper floret* hermaphrodite; lemma 2 mm. long; awn from the base of the lemma up to 9 mm. long. *Stamens* 2; anthers minute .75 mm. long, purple.

KHASI HILLS, 2,500 ft.

7. *Arthraxon lancifolius* Hochst. in Flora (1856) 188. Syn. *Arthraxon microphyllus* Hochst. in Flora (1856) 188.

An annual. *Culms* 10-40 cm. tall, very slender, decumbent at the base, then ascending, multi-noded, terete, puber-

lous below the inflorescence; upper branches very slender, long. *Leaf-blades* lanceolate with a cordate, amplexicaul base, slightly acuminate, green, spreading, 1.5-3 cm. long, 6-9 mm. wide, the older flat, soft, softly hairy, margins with tubercle-based cilia; median nerve slender; sheaths striate, terete, shorter than the internodes; ligules 1-2 mm. long, rounded, truncate, membranous, ciliate.

Inflorescence; common axis very slender, long exserted; false spikes 2-10, soft, densely flowered, unequal, .7-1.4 cm. long; joints 1-1.75 mm. long, filiform, ciliate on both sides, cilia often longer than the joints, articulation straight, not appendaged. *Sessile spikelets* 2.5-3.5 mm. long, straight, linear-lanceolate, almost compressed laterally. *Lower glume* membranous, lanceolate or linear-oblong, narrowed towards the base, very acute, margins not inturned, two-toothed or two-aristate, 5-7-nerved, very scabrid at the top. *Upper glume* membranous, lanceolate acute, ending in silky hairs .5-.8 mm. long, often spreading, 1-nerved. *Lower floret*; lemma 1-1.75 mm. long, lanceolate, acute, glabrous. *Upper floret*; lemma 1-1.75 mm. long, linear-oblong, obtuse, glabrous, 2-nerved, close and separated by a deep depression (groove), slightly and obscurely 2-toothed; awn 5-10 mm. long, column hidden behind the glumes or exserted. *Stamens* 2; anthers .4 mm. long. *Stigmas* small, equalling the styles in length. *Pedicelled spikelet* 2 mm. long, ciliate, ovate-lanceolate, empty; pedicel 1 mm. long.

A common gregarious grass in wet places in the hills above 5,000 ft. Small forms with one raceme are found on Japvo, Naga Hills, at 9,000 ft.

22. ANDROPOGON Linn.

Spikelets 2-nate, those of each pair differing in sex, and mostly also in shape and size, one sessile the other pedicelled on the articulate, fragile rhachis of many jointed, paired or digitate racemes terminating the culms; raceme pairs supported by a spathe or spatheole and frequently collected into a false panicle; the sessile spikelet falling with the contiguous joint and accompanying pedicel; joint and pedicels filiform or thickened upwards (rarely stout) and then the top frequently more or less cupular or auricled. *Florets*

2, lower reduced to an empty lemma, upper hermaphrodite in the sessile spikelets, male, neuter, or suppressed in the pedicelled spikelets. *Sessile spikelets* dorsally or laterally compressed, nearly always awned; callus short, mostly quite obtuse, shortly bearded. *Glumes* equal or sub-equal, sub-coriaceous to membranous, the lower flat or concave or channelled on the back with, at least from the middle upwards, sharply inflexed margins, 2-keeled, the upper more or less boat-shaped, keeled upwards, 3-1-nerved, sometimes aristate. *Lemmas* ciliate or ciliolate, rarely glabrous, of lower floret hyaline, 2-nerved, of upper 2-fid or 2-dentate, hyaline or firmer and sometimes sub-stipitiform below the insertion of the awn. *Palea* a hyaline nerveless scale or absent. *Lodicules* 2, minute, glabrous. *Stamens* 3. *Stigmas* laterally exerted; styles terminal. *Caryopsis* narrowly oblong to lanceolate, sub-terete, to plano-convex; embryo about the length of the grain. *Pedicelled spikelets* often very different from the sessile in shape, and less so in size, always more or less compressed dorsally, nerves concave, or channelled on the back, sometimes reduced and then often small or quite suppressed.

Mostly perennial grasses of varying habit; not aromatic.

Key to the species of *Andropogon*.

Inflorescence of paired racemes. ..	.. 1. <i>A. ascinodis</i> .
Inflorescence of fascicled racemes. ..	.. 2. <i>A. munroi</i> .

1. *Andropogon ascinodis* C. B. Clarke in Linn. Soc. Jour. XXV (1889) 87. Syn. *A. apricus* Hook. f. in F. B. I. VII (1897) 169; non Trin.

A perennial grass. *Culms* 50-200 cm. tall, erect, slender, terete, very smooth, branchy. *Leaf-blades* linear, setaceous-acuminate, 10-90 cm. long, 1-4 mm. broad, erect, coriaceous, flat or rolled when dry, finally reddish, glabrous, pubescent towards the base, scabrid at least above; median nerve white above, rather thick below; sheaths rounded, smooth, narrow, very slender, setaceous at the top, then sub-spathiform; ligules papyraceous, truncate, glabrous, 1-2.5 mm. long.

Inflorescence a false panicle; proper spathes green,

lanceolate, often ending in a short limb; spiciform racemes 2-5, 1.5-2.5 cm. long, hispid, very unequal in each fascicle, shortly pedicelled, more or less elongated from the spathe, with rigid cilia; rhachis fragile, joints and pedicels 3.5 mm. long, sessile; joints broadly cuneiform in outline, base narrow, rounded on the back, without a groove, glabrous or scabrous, with large white hairs (3-4 mm. long) which are absent at the top and on the articulation; articulation an oblique cup. *Sessile spikelets* compressed laterally, oblong in profile, pale, 5 mm. long, all hermaphrodite, rarely female, very rarely neuter. *Lower glume* membranous, linear, truncate, margins broadly inflexed and two-keeled, with a depressed furrow between the thick and scabrid keels, glabrous, 5-9-nerved; callus 1 mm. long, acute, silkily bearded. *Upper glume* 5 mm. long, keeled, compressed, obovate-oblong, obtuse, entire at the top and carrying an awn 10-15 mm. long, 1-nerved, keel scabrid, margins ciliate. *Lower floret*; lemma 4-5 mm. long, linear-oblong, 2-nerved, 2-keeled, ciliate. *Upper floret*; lemma 3.5-3.75 mm. long, obovate, membranous, back gibbous, 3-nerved, ciliate below the top, shortly 2-toothed, teeth ciliate (sparsely); awns robust, 25-30 mm. long, long exserted; palea 3.3-3.6 mm. long, linear-oblong, nerveless. *Pedicelled spikelets* neuter, equaling the sessile or shorter, narrower, pale or purplish, lanceolate-oblong; lower glume herbaceous, membranous, ovate-lanceolate or oblong, bicuspidate, acute, keel ciliate principally at the top; awn twice as long as the spikelet; upper glume the same length as the lower, membranous, 3-nerved, glabrous, shortly aristate. *Upper and lower florets* small or absent. *Stamens* absent. The *sessile spikelets* at the base of the racemes often neuter and rudimentary; anthers 2 mm. long, linear, brown.

Very common, KHASI and JAINTIA HILLS, 3-4,000 ft. NAGA HILLS 6-8,000 ft.

2. *Andropogon munroi* C. B. Clarke in Journ. Linn. Soc. XXV (1889) 87. t. 37.

A perennial grass. *Culms* tall, slender, 60-100 cm. tall, simple or sparingly branched upwards, terete or slightly

compressed, nodes glabrous. *Leaf-blades* 15-25 cm. long by 2.5 mm. broad, rather coriaceous, smooth, glabrous, nerves close set, glaucous beneath, midrib prominent; sheaths rather lax, striate, smooth and glabrous, somewhat compressed or keeled; ligule membranous, glabrous, truncate, erose, 2 mm. long or more.

Panicle 2.5-3 cm. long, as broad as long, of a few irregularly spreading branches; spathe 2.5-7 cm. long, very slender, terete, acuminate. *Racemes* 4-8, 6-18 mm. long, shortly stipitate, solitary or 2-3-nate, divaricate or drooping; peduncle and pedicels of racemes smooth, silkily ciliate; joints and pedicels or upper spikelets with irregularly toothed cupular tips; lowest pair or spikelets sometimes imperfect or male. *Spikelets* 4-6 pairs, 4.25 mm. long, laxly imbricating; callus softly bearded. *Sessile spikelet*; lower glume coriaceous, glabrous, shining, margins incurved, keels minutely scabrous, nerves 0, or 1 vanishing below the middle; upper glume acuminate, 3-nerved, ciliolate above the middle, awned or not, usually unawned. *Lower floret*; lemma hyaline, ovate-oblong, 2-nerved, glabrous. *Upper floret*; lemma as long as the lower lemma, lobes subulate; awn 6-16 mm. long, capillary; palea minute, truncate. *Pedicelled spikelets* male; lower glume linear-oblong, convex, sub-acute, 7-9-nerved; upper glume acuminate, 3-nerved, glabrous; lower floret as in the sessile spikelet; upper floret; lemma lanceolate.

Pulebadze, Naga Hills 7-9,000 ft.

23. CYMBOPOGON Spreng.

Spikelets 2-nate, those of each pair differing in sex and more or less in shape, except those of the lowest pairs of the lower, or of both racemes, which are homogamous (male or neuter) : one sessile, the other pedicelled, on the articulate, fragile rhachis of many-jointed, paired racemes, terminating the culms and their branches; raceme-pairs supported by a spatheole, collected in often decompound or supra-decompound, spatheate panicles; the fertile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels filiform or linear with frequently more or less

cupular or auricled tips, those of the lowest pair (raceme base) often conspicuously swollen, oblong or barrel-shaped and hard. *Florets* 2, lower reduced to an empty lemma, upper hermaphrodite in the sessile spikelets of the heterogamous pairs, male, rarely neuter, in those of the homogamous pairs and in the pedicelled spikelets. *Fertile spikelets* dorsally, rarely laterally, compressed, awned (normally); callus very short, obtuse, shortly bearded. *Glumes* equal or sub-equal, more or less chartaceous, the lower almost flat or slightly depressed or narrowly grooved on the back with, at least from the middle upwards, sharply inflexed margins, 2-keeled, the upper more or less boat-shaped, keeled upwards, usually 1-nerved. *Lemma* ciliate or ciliolate, (sometimes obscurely) of the lower floret entire, hyaline, 2-nerved, of the upper floret 2-fid or 2-lobed, hyaline, rarely firmer and almost stipe-like below the insertion of the awn; column of awn, if any, smooth. *Palea* absent. *Lodicules* 2, minute, glabrous. *Stamens* 3. *Stigmas* laterally exerted; styles terminal. *Caryopsis* oblong in outline, sub-terete or plano-convex in cross section; embryo almost half the length of the grain. *Pedicelled spikelets* usually slightly different in shape and size from the sessile, but never depressed or grooved on the back. *Glumes* muticous the lower chartaceous to sub-chartaceous, the upper thinner, of the lemmas only that of the lower floret present, hyaline, 2-nerved; upper floret usually represented by a naked male flower, rarely suppressed.

Perennial, densely tufted and usually aromatic grasses, with often very coarse leaves, and frequently much compound and contracted, spatheate panicles.

Key to the species of *Cymbopogon*.

Lower glume of sessile spikelet with a narrow groove from the middle downwards; leaf-blades flat; rounded or contracted at the base :—

Perennial; pedicelled spikelets glabrous. . . 1. *C. martini*.

Annual, pedicelled spikelets minutely hairy. 2. *C. clandestinus*.
Lower glume of sessile spikelet flat on the back or concave between the keels; leaf-blades narrowed downwards :—

Sessile spikelet awnless :—

Lower glume of sessile spikelet linear to linear-lanceolate, 5-6 mm. long, concave between the keels, wingless. .. 3. *C. citratus*.

Lower glume oblong to oblong-lanceolate, flat or nearly so on the back, 4-4.5 mm. long, narrowly winged above middle. .. 4. *C. nardus*.

Sessile spikelet awned :—

Inflorescence rather loose, not conspicuously villous; hairs not hiding the sessile spikelet; awn well-developed, geniculate :—

Leaf-sheaths compressed and keeled; culms compressed, lower glume with a deep channel between the raised indurated keels, minutely pubescent in the channel. .. 5. *C. hookeri*.

Leaf-sheaths and culms terete, lower glume flat on the back or depressed or grooved towards the base; glabrous between the keels :—

Sessile spikelets 5-6 mm. long; awn about 10 mm. long; racemes 2-2.5 cm. long :—

Lower glume linear-lanceolate, shallowly grooved or rarely flat, furrow above middle downwards, almost wingless, nerves inconspicuous. .. 6. *C. pendulus*.

Lower glume elliptic or oblong-elliptic, shallowly concave below the middle narrowly winged; nerves conspicuous. .. 7. *C. khasianus*.

Sessile spikelet 3-5 mm. long, awns up to 7 mm.; racemes 1.5-2 cm. long. 8. *C. exsertus*.

Inflorescence contracted, dense, rather narrow; hairs long and more or less concealing the sessile spikelets; awn usually straight and short; basal leaves very narrow. .. 9. *C. jwarancusa*.

1. *Cymbopogon martini* Watson in Atkins., Gazeteer N. W. Prov. India (1882) 392. Syn. *Andropogon martini* Roxb., Flor. Ind. I. (1820) 280.

A perennial aromatic grass. *Culms* erect, smooth, 90 cm. to over 1.8 m. tall, simple or sparingly branched, knotty at the base when old; base covered with dry sheaths. *Leaf-blades* almost lanceolate, or linear-lanceolate, cordate, round-

ed at the base, sub-amplexicaul, acuminate, flat, 25-40 cm. long, 1-3 cm. broad, green above, glaucous or pruinose below, very glabrous, with scabrid margins, rarely with scabrid surfaces; median nerve rather thick below, a white line above, lateral nerves numerous; sheaths very glabrous, smooth, faintly striate; ligule oblong scarious, 2-3 mm. long.

Inflorescence a false decom-pound panicle, linear-oblong, reddish at maturity, dense but often interrupted at the base; branches almost erect; the lower primary several noded, sub-flexuous, with nodes close together, the secondary basal, 2-3-nate, often only one, rarely 3-4-noded, all more or less crowded. True spathes sheath-like, three times longer than the common peduncle. *Spiciform racemes* epinastic at maturity, unequal, one sessile with a pair of homogamous spikelets at the base, 3-4-jointed, the other with the spikelets all heterogamous, 4-6-jointed, the homogamous pairs persisting at the top of the peduncle after the fall of the other spikelets; joints and pedicels 2 mm. long, linear-sub-claviform, rather thick, convex on the back, with a line of long hairs; margins bearded, articulations with a irregularly toothed appendage. *Sessile spikelets* hermaphrodite, ovate or ovate-oblong, flattened on the back. *Lower glume* oblong or ovate-oblong, obtuse, papyraceous, apex obtuse, often emarginate, or obscurely bilobed, with margins keeled and inturned, keels membranously winged at the top, with the back deeply and narrowly channelled, 2-nerved towards the top or without nerves apart from those of the keels; callus obtuse, obscurely keeled. *Upper glume* 4 mm. long, papyraceous, lanceolate-acute, margins ciliate, infolded, with a keel which is winged, serrulate above the middle, 3-nerved, ciliate. *Lower floret*; lemma 3.5 mm. long, oblong-obtuse, nerveless, ciliate. *Upper floret* hermaphrodite; lemma small, lobed at the summit or just to the middle, divided into fili-form fimbriae, glabrous or ciliate, with an awn which is often perfect; palea often absent. *Stamens* 3; anthers 1.5-2 mm. long. *Pedicelled spikelets* male, 4 mm. long, lanceolate-oblong, obtuse or rarely acute; upper floret missing; lower glume flat, muticous, 7-9-nerved, glabrous with

ciliate keels; upper glume lanceolate acute, 3-nerved, with a ciliate keel. *Lower* floret; lemma oblong, ciliate, 2-nerved.

KHASI and GARO HILLS and doubtless elsewhere.

2. *Cymbopogon clandestinus* Stapf in Bull. Imp. Inst. Lond. XXVII (1929) 458. Syn. *Andropogon schoenanthus* Linn. sub-sp. *clandestinus* Hack., Mon. Androp. (1889) 612.

A perennial grass with slender culms, up to 1.75 m. tall, smooth, glabrous and polished, terete; nodes glabrous. *Leaf-blades* linear, tapering above to a point, up to 50 cm. long, 6 mm. wide, rough on both surfaces; ligule a lacerate membrane, convex upwards, up to 2 mm. long.

Inflorescence an interrupted panicle 10-30 cm. long, nodding, made up of many, finally epinastic raceme-pairs issuing from spatheoles. *Racemes* 1.5-2.5 cm. long, one sessile the other shortly peduncled. *Spatheole* up to 4 cm. long, ovate-lanceolate, striate with scarious margins, long-acuminate; peduncle of the racemes 10 mm. long, smooth and glabrous, dilated at the top. Lowest pair of spikelets in one raceme homogamous, male or neuter, resembling the pedicelled spikelets, 4.5-5 mm. long; lowest joint of the raceme swollen, glabrous; pedicel of pedicelled homogamous spikelet inflated. *Sessile spikelets* 4 mm. long; lower glume as long as the spikelet, 2-toothed, narrowly winged above the middle; margins incurved, nerves obscure; upper glume boat-shaped, smooth and glabrous, as long as the spikelet. *Lower floret* neuter; lemma narrowly oblong, hyaline. *Upper floret* hermaphrodite; lemma hardly broader than the base of the awn, cleft into 2 subulate lobes; awn up to 15 mm. long. *Pedicelled spikelets* 4-6 mm. long, seated on clavate pedicels which are half the length of the sessile spikelets and ciliate with white hairs. *Lower glume* lanceolate in shape, 6 mm. long, minutely pubescent on back and sides, many-nerved; nerves prominent; upper glume somewhat shorter, 3-nerved, minutely pubescent or not. *Lemmas* absent or occasionally one present.

NAGA HILLS on the Burma frontier, 2,000 ft.

3. *Cymbopogon citratus* Stapf in Kew Bull. (1906) 357. Syn. *Andropogon schoenanthus* Linn., Syst. ed. X (1759) 1304, not of Sp. Pl.

A tall perennial, throwing up dense fascicles of leaves from a short, oblique, annulate, sparingly branched rhizome, usually barren but occasionally giving rise to stout, erect culms up to over 2 m. in height, glabrous, smooth, lowest internodes up to 30 cm. long. *Leaf-blades* linear, long-attenuate towards the base, tapering to a setaceous point, up to 1 m. long by 6-18 mm. wide, firm, glabrous, green, scabrid on the margins; sheaths terete, sub-coriaceous, quite glabrous and smooth; ligules very short, scarious, rounded or truncate.

Panicle spatheate, decompound, loose, 30-60 cm. long, nodding, spathes narrow lanceolate, acute or acuminate; spatheoles very narrow, linear-lanceolate to almost subulate, reddish; peduncles 6-10 mm. long, glabrous. *Racemes* 2-nate, finally spreading at right angles and epinastically deflexed, moderately dense, 14-25 mm. long, pale, variously tinged with dull purple, loosely villous, one sessile the other with a slender base, 2 mm. long and hairy; the pedicels of the homogamous pair also slender though short; fertile joints filiform, 2-3 mm. long, ciliate on both sides; cilia increasing upwards to more than 2 mm. long; tips obliquely auriculate and cupular; adjacent pedicels similar. One pair of homogamous spikelets at the base of the sessile raceme. *Fertile spikelets* linear or linear-lanceolate, acutely acuminate, 5-6 mm. long, reddish, glabrous; callus short obtuse, minutely bearded. *Glumes* sub-equal; lower sub-chartaceous, slightly depressed towards the base, otherwise flat on the back, keels acute, scaberulous above; intracarinal nerves 0 or 1, short and indistinct. *Upper glume* boat-shaped, slightly curved on the back, acute, keeled upwards. *Lower floret* reduced to a hyaline, oblong to almost linear, sub-2-nerved lemma, ciliolate above, slightly shorter than the glumes. *Upper floret* hermaphrodite; lemma narrowly linear, acute, about 4 mm. long, usually entire and awnless, rarely more or less 2-fid with a small bristle from the sinus. *Anthers* 2 mm. long. *Pedicelled spikelets* male or neuter, linear to subulate-lanceolate, as long

as the sessile, reddish, glabrous; lower glume 5-9-nerved, upper 3-nerved; lemma shorter to much shorter than the glumes, hyaline, ciliolate; of upper floret very narrowly linear, if present at all.

Occasionally cultivated.

4. **Cymbopogon nardus** Rendle in Cat. Welw. Afr. Pl. II (1899) 155. Syn. *Andropogon nardus* Linn., Sp. Pl. (1753) 1046.

An aromatic cæspitose perennial grass. *Culms* 1-1.5 m. tall, erect, or with a geniculate base, ascending, growing in thick tufts, more or less surrounded at the base with the firm, persistent sheaths. *Leaf-blades* flat, rigid, linear, long, setaceous-acuminate, green or glaucescent above, glabrous or with a few hairs at the base, more or less scabrid below, minutely scaberulous or smooth above; margins very scabrid; median nerve rather thick; lateral nerves numerous; sheaths grouped at the base of the culms, narrow, tight, very glabrous, striate; ligule membranous, 1-3 mm. long, rounded, truncate, glabrous, not decurrent at the margins; true spathe narrowly cymbiform, reddish, twice as long as the common peduncle, so equalling the racemes.

Inflorescence a panicle which is pyramidal or linear oblong up to 80 cm. long, lax, decompound, with the branches and branchlets kneed, with rather distant nodes; spiciform racemes unequal, 8-16 mm. long at first erect then deflexed, one is almost sessile and has a pair of homogamous spikelets close to the base, the other peduncled with all spikelets heterogamous; the homogamous pair sterile, falling very tardily; joints of the rhachis and pedicels linear-filiform, about half the length of the sessile spikelets, glabrescent or pubescent on the back and margins; articulations very shortly cupped and appendaged. *Spikelets* without awns, sometimes mucronate, violet or reddish, the sessile hermaphrodite, 4-4.5 mm. long, lanceolate-acute; lower glume 4-4.5 mm. long, papyraceous, with keels very narrowly winged, entire or 2-toothed at the top, 2-4-nerved between the keels, glabrous; callus very small and shortly bearded; upper glume 4-4.5 mm. long, lanceolate or elliptic, navicular. *Lower floret*; lemma 3.5-4

mm. long, oblong, obtuse, nerveless, ciliate. *Upper floret* hermaphrodite; lemma shorter, linear, divided into 2 short teeth, with a mucro shortly or not exerted. *Pedicelled spikelets* male, 3·8-4 mm. long, lanceolate-acute.

This grass smells of lemon and is only known in cultivation.

5. *Cymbopogon hookeri* Stapf ex Bor, Ind. For. Rec. (Bot.) I. 3 (1938) 92. Syn. *Andropogon hookeri* Munro ex Hack., Mon. Androp. (1889) 614.

A perennial grass, tall, slender, up to 2 m. high. *Culms* terete or compressed below, smooth and glabrous. *Leaf-blades* 30-40 cm. long by 2·5-5 mm. broad, rather rigid, smooth, margins scabrid; midrib broad, keeled below; leaf-sheaths remarkable in being keeled and compressed, very glabrous and smooth, striate; ligules obtuse, membranous, glabrous.

Panicle small for the genus, linear, interrupted, 30-40 cm. long, primary branches of 1 or 2 nodes giving off solitary secondary branches, sub-erect. *Racemes* sub-equal; joints and pedicels dorsally glabrous; margins sparsely villous, tips 2-3-lobed. *Spatheoles* 1·7-3 cm. long; joints and pedicels or racemes stout, clavate, with stout hairs on both sides. *Sessile spikelets* 6 mm. long; callus short obtuse, minutely bearded; spikelets dorsally concave and puberulous, keels scabrid; lower glume coriaceous-chartaceous, acute, minutely 2-toothed, keels not margined or winged obscurely 2-nerved; upper lanceolate, acute, keel scabrid, margins eciliate. *Lower floret*; lemma as long as the spikelet, hyaline, margins inflexed ciliate. *Upper floret* hermaphrodite; lemma 2-cleft, lobes slender, eciliate; awn nearly 2 cm. long. *Pedicelled spikelets* equalling the sessile, linear-lanceolate, glabrous.

AKA HILLS.

6. *Cymbopogon pendulus* Watson in Atkins., Gazeteer N. W. Prov. Ind. (1882) 392. Syn. *Andropogon pendulus* Nees ex Steud., Syn. Pl. Glum. (1854) 388.

Close to *Cymbopogon nardus* Rendle. *Culms* very tall; leaves up to 1 m. in length, median nerve very thick at the

base; spatheole up to 2 cm. exceeding the common peduncle several times in length.

Inflorescence 30-50 cm. long, oblong, lax, decompound, branched to the third degree, branches equal, with branches and branchlets somewhat nodding, often undulate, rather flexuous, the primary long, slender with rather distant nodes; the secondary 2-nate, 2-4-noded; the tertiary simple. *Racemes* with pairs not crowded, 2-2.5 cm. long, with 4-5 joints with long hairs. *Hermaphrodite spikelets* lanceolate, pale green, 5-6 mm. long, with an awn 9-11 mm. long; lower glume more or less winged (wing narrow), 4-nerved in addition to the carinal nerves, shallowly 2-pitted at the base, rarely without shallow pits. *Male spikelets* violet or reddish at the summit.

Foothills of the Himalaya.

7. *Cymbopogon khasianus* Stapf ex Bor. Ind. For. Rec. (Bot.) I. 3 (1938) 92. Syn. *Andropogon nardus* Linn. var. *khasianus*, Hack., Mon. Androp. (1889) 662.

Perennial. A tall grass up to 2 m. high, base stout, covered with the remains of old sheath-bases; culms erect from the rootstock, smooth and glabrous. *Leaves* flat, up to 2 cm. wide, smooth and glabrous on the surfaces, firm; margins thickened and serrulately scabrid; blades linear, gradually tapering to a firm setaceous point, rounded at the base; sheaths terete, much shorter than the internodes, striate, smooth and very glabrous; basal sheaths loose, scarious, long persistent; ligules up to 2 mm. long, truncate, membranous.

Panicle elongate, 30-90 cm. long, narrow, contracted or more often loose, compound or decompound, nodding; spathes narrowly lanceolate, 1.8-3 cm. long; spatheoles similar in shape, 1.25-1.8 or even 3 cm. long; racemes; one sessile the other on a short glabrous peduncle, the former shorter than the latter which may be up to 2 cm. long; joints and pedicels about 2.5 mm. long, compressed, short ciliate on both sides, top cupular with an irregular number of tooth-like appendages. Lowest pair of sessile raceme homogamous, all the other pairs of spikelets heterogamous. *Sessile spikelet* 5-5.5 mm. long, elliptic-oblong in shape or ovate-lanceolate without the wings. *Lower glume* ovate-lanceolate

in shape, 2-keeled, the keels broadly winged above the middle, acute or more usually obtuse, back flat or slightly convex or often with two shallow depressions, 7-9-nerved; nerves often conspicuous above the middle; margins narrowly inflexed, ciliate. *Upper glume* ovate-lanceolate, acute, boat-shaped, 3-nerved, margins inturned and long-ciliate. *Lower floret*; lemma hyaline, nerveless, as broad and as long as the upper glume; margins incurved, ciliate. *Upper floret* hermaphrodite; lemma narrow (.5 mm. broad), linear, 3.5-4 mm. long, cleft into two lanceolate, ciliate lobes to below the middle, awn up to 14 mm. long; palea absent. *Stamens* 3, anthers 2 mm. long. *Pedicelled spikelets* male or neuter; lower glume lanceolate when flat or narrowly ovate-lanceolate, sides rounded, margins inturned, hyaline; nerves many, up to 13; upper glume obovate when flat, the upper half of the margins hyaline and very broad ciliate, 3-nerved; lemma similar to the lower lemma of the sessile spikelet. *Anthers* 3, 2 mm. long. *Lodicules* two, cuneate, glabrous.

Very common in the KHASI and NAGA HILLS.

8. *Cymbopogon exsertus* A. Camus in Rev. Bot. Appl. IV. 287. Syn. *Cymbopogon nardus* L. sub-sp. *marginatus* var. *exsertus* Hack., Mon. Androp. (1889) 608.

Culms short, slender. *Leaf-blades* long (up to 1 m.) and narrow, 4-8 mm. wide, rough on both surfaces; margins scabrid; sheaths terete, loose, striate, smooth and glabrous; ligule membranous.

Panicle 30-35 cm. long, very narrow, lax-flowered; branches short, the primary 1-4-noded, erect, strict, upper nodes distant, the secondary solitary, 1-noded. Proper spathes 1.5-2 cm. long, reddish-green. Racemes completely exserted from the spathes, 1.5-2 cm. long, 5-6-jointed; joints densely ciliate. *Spikelets* 4-6 mm. long, lanceolate or linear-lanceolate; lower glume 2-toothed, dorsally flat or shallowly depressed, nerveless, keels hardly margined; lobes of upper lemma broad, densely ciliate; awn 1.25 cm. long.

Plains of the Assam Valley.

9. *Cymbopogon jwarancusa* Schult., Mant. II. (1824) 458. Syn. *Andropogon jwarancusa* Jones in Asiat. Res. IV (1795) 109.

Usually a tall perennial grass, but may be only a few inches high, roots aromatic, densely tufted, the stems with firm, persistent, finally loose and open and tortuous leaf-sheaths, more or less inflated below, 1-2 m. tall. *Leaves* 15-60 cm. long, narrowly linear, tips capillary, filiform at the base, up to 5 mm. wide flat; sheaths glabrous, lower dilated; ligules shortly oblong, membranous, ciliolate.

Panicle usually long, narrow, interrupted, branches distant or crowded, sub-simple or much, loosely or densely, branched; spathes up to 5 cm. with the spatheoles (proper spathes) 1.25-1.8 cm. long, the latter longer than the peduncles of the racemes and narrowly lanceolate. *Racemes* unequal, 6-18 mm. long, spikelets 3-4 pairs, half hidden by the 5 mm. long villae of the joints and pedicels. *Sessile spikelets* 5 mm. long, ovate or linear-lanceolate in shape, lowest pair of the sessile raceme homogamous (neuter) those of the peduncled raceme heterogamous. *Lower glume* 2-keeled, flat or concave between the keels, glabrous, margins narrowly inflexed, keels wingless, nerves 2-4 or 0 between the keels; keels said to be occasionally scabrid, ciliate. *Upper glume* cymbiform as long as the lower glume, 3-nerved, acute, margins narrowly inflexed, hyaline and ciliolate. *Lower floret* neuter; lemma up to 5 mm. long, narrowly lanceolate, 2-nerved. *Upper floret* hermaphrodite; lemma narrow, 2-3 mm. long, cleft at the top, lobes subulate and ciliate, awn 5 mm. long. *Pedicelled spikelets* 5 mm. long; lower glume elliptic-lanceolate, 7-9-nerved, membranous, rounded at the sides, convex or almost flat on the back, margins incurved; upper glume similar in size, texture and shape, 3-nerved, margins hyaline, incurved ciliate; lower floret absent; upper floret; lemma lanceolate, hyaline.

Not common, but has been collected near Goyabari, Kamrup.

24. HYPARRHENIA Anders.

Spikelets 2-nate, those of each pair differing in sex and more or less in shape, or those of the lower pair or pairs homo-

gamous (male or neuter), one sessile and the other pedicelled, on the articulate fragile rhachis of few- to many- jointed paired racemes, terminating the culms and their branches; raceme-pairs supported by a spatheole, collected into scanty or compound to decompound spatheate panicles; the fertile spikelets falling with the contiguous joint and the accompanying pedicel; joints and pedicels finely filiform, with more or less obliquely truncate sometimes obscurely auricled tips, in racemes with homogamous spikelets on the joint or joints below the lowest fertile spikelet entering into the formation of the raceme base, shorter to very short, eciliate and tardily disarticulating. *Florets* 2, lowest reduced to an empty lemma, upper hermaphrodite in the sessile spikelets of the heterogamous pairs, male or neuter (rarely quite suppressed) in those of the homogamous pairs and of the pedicelled spikelets. *Fertile spikelets* more or less flattened dorsally but with rounded sides, awned (very rarely awnless); callus short and obtuse or more often acute to pungent, shortly bearded. *Glumes* equal, more or less chartaceous, mostly thin, the lower narrowly truncate or 2-dentate, sometimes with a very shallow longitudinal depression, with very narrow involute margins up to 2/3rds or more, then equally narrowly inflexed from the very fine short or obscure keels, the upper narrowly and shallowly boat-shaped, rounded on the back below, finely keeled towards the tips only, 3-nerved. *Lemma* ciliate or that of the upper floret glabrous, of the lower floret hyaline, 2-nerved (often very faintly), rarely quite nerveless, of the upper stipitiform with a very fine delicate hyaline base, above it gradually hardened with narrow hyaline margins which gradually run out into minute teeth, passing between the teeth into the mostly distinctly kneed, more or less hirtellous or sub-plumose awn. *Palea* absent, rarely a small hyaline scale. *Lodicules* 2, minute, glabrous. *Stamens* 3. *Stigmas* laterally exserted; styles terminal. *Caryopsis* oblong in outline, sub-terete to plano-convex in cross-section: embryo about half the length of the grain. *Pedicelled spikelets* acute, often mucronate or aristulate from the lower glume, usually somewhat longer than the fertile and more distinctly 2-keeled (often below the middle), lemma of both florets developed,

even in neuter spikelets, rarely the upper or both suppressed.

Perennial or annual, mostly coarse grasses with often large, loose, rarely much contracted, panicles; never aromatic.

Hyparrhenia griffithii Bor, Ind. For. Rec. (Bot.) I. 3 (1938) 92.

A perennial grass from a creeping rhizome. *Culms* erect or slightly geniculate, slender, glabrous, up to 2 m. tall, innovations intravaginal, leafy. *Leaves* linear from a rounded contracted base, tapering to a very fine point, up to 40 cm. long, 8 mm. wide, glabrous on both surfaces or covered with soft white hairs when young; median nerve white, prominent; margins minutely scabrid; basal sheaths carinate, persistent, glabrous, upper slipping from the culm, terete, glabrous or with a few white hairs, very hairy when young; margins often ciliate, throat hairy; ligules membranous, convex upwards, up to 2 mm. long.

Inflorescence a compound, spatheate panicle up to 35 cm. long, contracted; branches erect, strict, filiform, issuing from lanceolate to linear, setaceous-acuminate spathes, which are up to 15 cm. long; spatheoles narrow 3-4 mm. wide, linear, convolute, 4-6 cm. long; common peduncle filiform, up to 4.5 cm. long, shorter than the spatheole, glabrous and smooth below, covered in the upper quarter with 4 mm. long white hairs from tubercle-bases, enclosed in the spatheole until anthesis, afterwards emerging. *Racemes* in pairs, epinastic after anthesis, unequally peduncled (longer peduncle 3 mm. long), 2 cm. long; peduncles bearded at the base; joints and pedicels filiform, up to 4 mm. long, flattened, densely ciliate, tip expanded and very oblique. The lowest pair or two lowest pairs of spikelets homogamous, male or neuter; heterogamous spikelets 2-3 pairs, the sessile hermaphrodite, the pedicelled male or neuter; callus acute, bearded. *Homogamous spikelets* ovate-oblong in shape. *Lower glume* 6.5 mm. long, up to 11-nerved, 2-toothed, one-toothed being extended into a short bristle or not; back rounded or flat; nerves with long white hairs. *Upper glume* 6.5 mm., 3-4-nerved, oblong-lanceolate, rounded on the back; margins long,

ciliate. *Lower floret* barren; lemma narrow, 6 mm. long, hyaline, ciliate on the margins. *Upper floret*; lemma ovate-lanceolate, hyaline, margins ciliate at the top; palea minute, sometimes containing a rudimentary ovary and stamens or stamens only, usually empty. *Stamens* if present 3; anthers 4 mm. long. *Sessile spikelets* narrowly elliptic-oblong in shape. *Lower glume* 5.5 mm. long, truncate, 2-toothed, back slightly rounded below, flat or shallowly depressed above, 5-9-nerved; margins involute; nerves covered with stiff white hairs up to 4 mm. long. *Upper glume* lanceolate, oblong, sub-acute, 6 mm. long, keeled, depressed on either side of the keel, 1-3-4-nerved, ciliate on the keel and pubescent on the sides at the top. *Lower floret* barren; lemma linear-oblong, 5 mm. long, obtuse, hyaline, ciliate on the margins at the top; palea absent. *Upper floret* hermaphrodite; lemma 4 mm. long, linear, concave, translucent, margins carried out into two subulate teeth, awned; awn slightly narrower than the lemma; column 2 cm. long, dark brown, hispid with rufous upwardly-directed hairs, remainder 2 cm., antrorsely barbed; palea, if present, minute. *Stamens* 3; anthers 2.5 mm. long. *Ovary* ovoid; stigmas 2. *Grain* terete 4 mm. long. *Pedicelled spikelets* barren, narrower, linear-lanceolate in outline. *Lower glume* 9-11-nerved, flat on the back, 2-toothed or one tooth extended into a barbed bristle, 2.5 mm. long. *Upper glume* lanceolate, rounded on the back, 3-nerved. *Lower floret* absent or represented by a very narrow hyaline lemma; palea, if present, minute, truncate. *Upper floret*; lemma hyaline, ovate-lanceolate, ciliate; palea, if present, minute, truncate.

This grass covers large areas in the Synteng country north of NARTIANG, KHASI and JAINTIA HILLS.

Flowers in November-December.

26. SCHIZACHYRIUM Nees.

Spikelets 2-nate, of each pair differing in sex, and mostly also more or less in shape and size, one sessile, the other pedicelled, on the articulate, fragile, rhachis of many-jointed, solitary racemes terminating the culms and their branches, supported by spathes and frequently collected into a false

panicle, the sessile spikelets falling with the contiguous joints and the accompanying pedicelled spikelet; joints and pedicels thickened upwards, often rather stout, with a scarious, cupuliform, more or less dentate, terminal appendage. *Florets* 2, the lower reduced to an empty lemma, upper hermaphrodite in the sessile, male, neuter or absent in the pedicelled spikelets, or both lemmas suppressed in these. *Sessile spikelet* dorsally compressed or sometimes in their lower half almost terete, awned; callus short, with a short beard at the base. *Glumes* equal or sub-equal, lower chartaceous (often thinly to sub-coriaceous, more or less convex (to sub-terete) or flat on the back, at least from the middle upwards, sharply inflexed and mostly narrow margined, 2-keeled, the keels running out into teeth or mucros; upper thinner to membranous, narrowly boat-shaped to dorsally flattened, keeled (at least upwards) 1-3-nerved, the delicate margins ciliate. *Lemmas* ciliolate, hyaline, of lower floret membranous downwards and often purplish, 2-nerved, of upper usually 2-fid sometimes very deeply, or 2-dentate, rarely entire, awned; awn from the sinus or a continuation of the entire lemma; palea absent or a minute hyaline scale. *Lodicules* 2; minute, glabrous. *Stamens* 3 rarely 2. *Stigmas* laterally exerted low down; styles terminal. *Caryopsis* narrowly linear in outline, or tapering upwards, subterete; embryo short. *Pedicelled spikelet* similar to the sessile, but usually relatively broader and flatter, or more or less reduced, and then sometimes quite small. *Glumes* more or less membranous, the lower aristulate or muticous.

Annual or perennial grasses, rarely suffrutescent, never very tall. *Culms* slender. *Leaf-blades* folded in the bud, usually narrow. *False panicles* varying from very loose and scanty to densely fascicled, with the spathes mostly very narrow, scarious, membranous or lower down herbaceous.

Key to the species of *Schizachyrium*.

Annals.

Fastigiately branched; racemes silkily villous; joints appendaged. 1. *S. exile*.

Divaricately branched; racemes sparsely hairy; joints 2-toothed. 2. *S. brevifolium*.

Perennials.

Joints of the racemes 5-7 mm. long, glabrous or ciliolate; upper lemma of sessile spikelet deeply bifid. 3. *S. semiberbe*.

Joints of the racemes half the length of the sessile spikelet, furnished with long white hairs. Upper lemma of sessile spikelet with two short teeth. 4. *S. delavayi*.

1. *Schizachyrium exile* Stapf in Flor. Trop. Afr. IX, 191. Syn. *Andropogon exilis* Hochst. in Flora XXVII (1844) 241.

Annual. *Culms* fascicled, from few to very many, erect, 15-60 cm. high, many noded, terete or slightly compressed below, branched, glabrous. *Leaf-blades* linear, tapering to an acute point, 2.5-15 cm. long, 2-3 mm. wide, glabrous, with a few long white hairs at the junction with the sheath, scabrid on the margins and towards the tip, green, turning red; sheaths somewhat loose, terete, lower ones compressed and keeled, glabrous and smooth, the upper spathaceous; ligules membranous, short, rounded. *Spathes* narrow acute, 2.5-3.5 cm. long, as long as, or slightly shorter than, the racemes, narrowly linear-lanceolate, acute, at length often turning a brilliant red.

Racemes sub-sessile in the spathe, or on distinct, but very short, peduncles with hollowed out, clavate tips, which on one side are produced into a short, obtuse appendage; racemes 1.8-3 cm. long, 8-12-jointed; joints 4-6 mm. long, gradually widening upwards, clavate, pinkish above, with an oblique, membranous, minutely denticulate or almost entire appendage, which is tubular at the base and from 1 to over 2 mm. long; pedicels slender, sub-linear, slightly shorter than the joint; hairs as on the joint. *Sessile spikelet* narrowly linear-lanceolate, slightly convex on the back, including the bearded callus up to 8 mm. long, greenish or turning red. *Glumes* equal; the lower sub-coriaceous, more or less convolute, lanceolate when flattened out, produced into a narrow more or less 2-dentate acumen, with long white hairs on the back to beyond the middle, scaberulous along the keels of the back; intracarinal nerves 2, very faint or

quite obscure; upper linear-subulate in profile, with a long fine point, membranous, 1-nerved, keeled above the middle. *Lower floret* reduced to a linear-lanceolate, acute, hyaline, ciliolate, nerveless lemma up to 4 mm. long. *Upper floret* hermaphrodite; lemma bifid to a quarter from the base, not quite 4 mm. long, segments acute, glabrous, awn 12-20 mm. long, kneed at, or slightly below, the middle; column brown, bristle white. *Stamens* 2 (?); anthers narrowly linear, 1.25-2 mm. long, often much smaller. *Caryopsis* very slender, linear, almost 4 mm. long, embryo about half its length. *Pedicelled spikelet* reduced to a lanceolate-subulate glume, which is 2-keeled with 1 intracarinale nerve produced into a bristle-like awn, 6-8 mm. long, with or without a minute mucro at its base, very rarely a rudimentary 2nd glume.

This grass, when young, is eaten by cattle. Plains districts of the lower Assam Valley.

2. *Schizachyrium brevifolium* Nees, Agrost. Bras. (1829) 332. Syn. *Andropogon brevifolius* Sw., Prod. Veg. Ind. Occ. 26.

Annual. *Culms* weak, up to 60 cm. long, usually ascending from a decumbent base, rarely erect, branched from most of the nodes, slender, geniculate, glabrous, compressed below, *Leaf-blades* linear, constricted at the base, obtuse or sub-obtuse or suddenly narrowed to a sharp point, 2.5-3.5 cm. long, 2-6 mm. wide, upper narrower and more acute, glabrous, smooth, except along the margins and on the lower side of the midrib, nerves very fine; leaves like the spathes eventually turning red; leaf-sheaths compressed, the lower keeled, somewhat lax, glabrous, smooth, the uppermost spathe-like; ligules membranous, very short, ciliolate. *Spathes* on sub-capillary curved or flexuous branchlets, very narrow, acute, reaching to the base of the racemes or slightly exceeding them, 3-2 cm. long.

Racemes borne on filiform, upwards clavate, peduncles, slender, from less than 1.25 cm. to over 2.5 cm. long, 5-11-jointed; joints 2-2.5 mm. long, widening upwards from a slender base, tips 2-toothed, glabrous, smooth. *Sessile spikelet*

linear-lanceolate, acuminate, more or less convex on the back, pale green, including the minute callus, which is more or less shortly bearded, about 3 mm. long. *Glumes* equal; lower thinly chartaceous, 2-dentate, scaberulous along the keels, with very faint intracarinial nerves, smooth or very minutely scaberulous on the back; upper glume boat-shaped, acute, 1-nerved, ciliate. *Lower floret* reduced to an elliptic-obtuse, hyaline, nerveless, ciliate lemma, distinctly shorter than the glumes. *Upper floret* hermaphrodite; lemma 2-fid almost to the base, 1.5 mm. long, segments linear-oblong, sub-obtuse, sparingly ciliate, awn 8-16 mm. long. *Anthers* .5 mm. long, deep red or purple. *Caryopsis* sub-linear, tapering upwards. *Pedicelled spikelet* reduced to a minute glume, often passing indistinctly into the pedicel and produced into a bristle like awn about 4 mm. long.

KHASI and JAINTIA HILLS, NAGA HILLS, DARRANG.

3. *Schizachyrium semiberbe* Nees, Agrost. Bras. (1829) 336. Syn. *Andropogon semiberbis* Kunth, Enum. Pl. I. 489.

Perennial. *Culms* 60 cm. to almost 2 m. high, erect or slightly geniculate from a short rhizome, rather stout, terete or compressed, branched (copiously or sparingly). *Leaf-blades* linear, shortly acute, gradually passing into the sheath or slightly contracted at the base, up to 50 cm. long, 2.5 mm. wide, flat or folded when young, firm, glabrous, rarely hairy, smooth below, scabrid above and along the margins; leaf-sheaths firm, striate, glabrous, or more or less hirsute, the lowest compressed and keeled, the upper terete, tight; ligules scabrid, truncate, ciliate. *Spathes* very narrow, 4-6 cm. long, the upper bladeless or with a minute blade.

Racemes on peduncles which are entirely, or almost entirely, enclosed in the spathe and thickened towards the urceolate, minutely denticulate tips, 4 to almost 5 cm. long, 8-14-jointed, slender; joints 5-7 mm. long, linear, cuneate, semi-terete, with an asymmetrical, urceolate, 2-dentate appendage, smooth on the back, glabrous or rarely obscurely ciliate on the margins, straw coloured or reddish, pedicels similar, 3-5 mm. long, ciliate along the outer edge, (rarely

almost glabrous), hairs increasing upwards, the uppermost up to 2 mm. long. *Sessile spikelet* subulate-lanceolate to linear, 2-dentate, including the shortly bearded callus, 6-8 mm. long, glabrous. *Glumes* sub-equal; lower sub-coriaceous, reddish or dark-brown, rounded and smooth on the back beyond the middle, then thinner, pale, flat and distinctly 2-keeled, with the keels scaberulous, intracarinal nerves 2-4, very obscure; upper glume slightly shorter, firmly membranous, rather thin above the middle, subulate, acuminate, 1-nerved, keels scaberulous, margins ciliate. *Lower floret* reduced to a linear-oblong, acute lemma up to 5 mm. long, sub-2-nerved, hyaline, ciliate. *Upper floret* hermaphrodite; lemma 4 mm. long, divided to three quarters of its length, base obovate, segments lanceolate, acute, ciliate; awn 14-16 mm. long, kneed in the middle, column dark, bristle white; palea absent or a microscopic scale. *Stamens* 3; anthers 1 mm. long. *Caryopsis* cylindric, over 2 mm. long; scutellum less than half the length. *Pedicelled spikelet* male, (or neuter and more or less reduced) narrowly lanceolate, acuminate, about 4 mm. long, glabrous; lower glume flat, 2-keeled, minutely 2-dentate, with a short bristle, minutely scaberulous upwards, intracarinal nerves 5-7; upper glume sub-hyaline, sub-3-nerved, eciliate. *Lemma* of lower florets as in the sessile spikelet. *Lemma* of upper floret entire, linear-oblong, sub-acute, over 2 mm. long, hyaline, 1-nerved, ciliate, awnless.

A good fodder for stock at all times. Found near JOWAI, KHASI and JAINTIA HILLS, 3,000 ft.

4. *Schizachyrium delavayi* (Hack.) Bor, Ind. For. Rec. (Bot.) I. 3 (1938) 95. Syn. *Andropogon delavayi* Hack., Mon. Androp. (1889) 404.

Culms 40-120 cm. tall, slender to stout, erect, terete many-noded, except for the nodes very glabrous, not striate, branching or not, flower bearing branches from the upper nodes. *Leaf-blades* linear, long tapering to a fine point, 8-25 cm. long, 3-4 mm. broad, flat, rigid, sub-erect, glaucous, glabrous or strigose-pubescent below, margins scabrid, many-nerved, median nerve very broad, white; sheaths rather loose,

striate, smooth and glabrous below, softly pubescent towards the top, lowest or the lower compressed and keeled, upper spathe-like; ligule a narrow membranous ring, convex upwards, ciliate. True spathes 2-3 cm. long, without blades, mucronate, reddish.

Racemes 2-3 cm. long, compressed, glabrescent, green or purplish; joints and pedicels about half the length of the sessile spikelet, furnished with white hairs which increase in length upwards, the upper hairs as long as the joint. *Sessile spikelets* including the callus about 5 mm. long; callus shortly bearded. *Lower glume* chartaceous-membranous, narrowed above, very obtuse, entire or emarginate, margins narrowly inflexed, keels sub-marginate, back flat, 3-5-nerved, very glabrous, nerves evanescent above the middle. *Upper glume* as long as the lower, membranous, broadly lanceolate, acute, keeled above, 3-nerved, very glabrous. *Lower floret* reduced to a hyaline, nerveless lemma as long as the lower glume, oblong-obtuse, ciliate. *Upper floret* hermaphrodite; lemma scarcely broader than the base of the awn, with 2-minute lanceolate teeth, glabrous; awn 8-10 mm. long, column glabrous. *Lodicules* glabrous. *Anthers* 2.5 mm. long. *Pedicelled spikelets* male, lanceolate-oblong, equalling the sessile, resembling them in all respects except that the lemma of the upper floret with its awn is missing.

LARURI, NAGA HILLS, 2,500 ft.

27. HETEROPOGON Pers.

Spikelets 2-nate, those of the lower (1 to many) pairs alike in sex and shape, male or neuter, of the upper pairs differing in sex and strikingly so in shape, one of each pair sessile, the other pedicelled on the many-jointed rhachis of solitary racemes terminating the culms and their upper branches; rhachis tough, or upwards tardily disarticulating and glabrous between the homogamous pairs, readily disarticulating above them; homogamous pairs long persistent, the spikelets of the heterogamous pairs falling separately, the pedicelled with the pedicels, the sessile with the contiguous joint of the rhachis and the adjacent pedicel or its

base. *Florets* 2, lower reduced to an empty lemma, upper female or hermaphrodite in the sessile spikelets of the heterogamous pairs, male or neuter in all the other spikelets. *Fertile spikelet* terete or sub-terete, awned; callus long, pungent, densely bearded upwards. *Glumes* equal; the lower coriaceous, rarely chartaceous, more or less tightly involute, quite keelless, nerves obscure, often connected by a few transverse nerves in the upper part; the upper with a deep longitudinal groove on each side, coriaceous, rarely chartaceous between them, thinner towards the margins, membranous at the tip, 3-nerved. *Lemma* of the lower floret hyaline, nerveless, of the upper floret stipitiform from a hyaline very slender base, cartilaginous upwards and passing into a usually stout, geniculate awn. *Palea* small or absent. *Lodicules* more or less reduced, to very minute. *Stamens* 3, often rudimentary or absent. *Stigmas* exerted terminally or laterally. *Grain* more or less linear in outline, sub-terete, slightly dorsally compressed; embryo somewhat exceeding the middle of the grain. *Male* (or neuter) *spikelets* dorsally flattened, usually slightly asymmetric and often somewhat twisted, muticous, imbricate. *Lower glume* herbaceous, many nerved, winged upwards from one or both keels; *upper* membranous, lanceolate-oblong, acute, 3-nerved. *Lemmas* hyaline, 1-nerved, well developed or more or less reduced. *Stamens* 3 or absent.

Perennial or annual grasses with simple or more often, upwards branched culms; branches few to many, mostly flowering and gathered into a spatheate panicle; racemes conspicuously dorsi-ventral, the bases of the male (or neuter) spikelets sub-imbricate on the back of the raceme, their upper parts bending forward round the sides, forming a hollow in which the fertile spikelets are enclosed, with their awns exerted anticously and often inter-twisted.

Heteropogon contortus Beauv. ex Rœm. et Schult., Syst. Veg. II (1817) 836. Syn. Andropogon contortus Linn., Sp. Pl. (1753) 1045.

Perennial, cæspitose, up to over 1 m. high, innovations extra- and intra- vaginal. *Culms* erect or geniculate ascend-

ing, more or less compressed below, glabrous, smooth, quite simple or more often branched. *Leaves* glaucous-pruinose, linear from an equally wide base, acute, tapering to a fine point, 7.5-23 cm. long, 3-7 mm. wide, flat, glabrous or with a few tubercle-based hairs towards the base particularly on the margins; margins cartilaginous, slightly rough; midrib slender, prominent below; sheaths compressed, keeled, quite glabrous or with a few tubercle-based hairs towards the mouth; ligules short, truncate, ciliate.

Inflorescence a single terminal raceme, or more often several flowering branches, simple or divided from the base, forming tiers and collected into a scanty, rarely copious, and more or less fastigate, spatheate panicle. *Spatheoles* narrow, long-tapering to an acute point, 7.5-10 cm. long, herbaceous to sub-herbaceous, glabrous. *Peduncle* shortly filiform, strict or slightly arched, sub-terminally exerted during flowering, then lengthening out. *Racemes* somewhat stout, 2.5-7.5 cm. long, of 3-10 homogamous and, frequently up to 12, heterogamous pairs; joints 4-2 mm. long, rufous-ciliate on the sides, cilia increasing upwards and forming a dense beard, concealing the joint and the base of the pedicel; pedicels glabrous 1 mm. long, disarticulating at the base with a very oblique scar. *Glumes* equal, coriaceous; lower tightly involute, truncate, minutely pubescent or hirtellous, about 9-nerved, nerves slightly raised; upper glume narrowly linear-oblong, sub-obtuse, sides much thinner than the hispidulous, coriaceous, very obtuse, dorsal keel. *Lower floret* reduced to a linear-oblong, hyaline, ciliate, nerveless lemma, 3 mm. long. *Upper floret* female; lemma stipitiform from a very slender hyaline base, cartilaginous above it and passing into a stout geniculate awn, 5-10 cm. long; column at length dark-brown, shortly greyish pubescent; palea absent. *Lodicules* microscopic. *Stamens* absent or reduced. *Stigmas* exerted terminally. *Caryopsis* linear 3-3.5 mm. long, semi-terete, grooved on the face, whitish. *Male spikelets* all alike, or the lowest somewhat reduced, dorsally flattened, oblong-lanceolate, sub-acute, 8-10 mm. long, green, the sessile almost symmetric, the pedicelled somewhat asymmetric and contorted; glumes sub-equal, the lower herbaceous, closely many nerved, glabrous or variously hairy, hairs

tubercle-based, few or many in a single row along the margins, or spread over a marginal zone, or all over and then sometimes long and rigid and spreading, keels more or less unequally winged upwards, inflexed flaps very narrow; upper glume membranous, acute, 3-nerved, ciliate upwards; lemmas linear-oblongate, hyaline, 1-nerved, ciliate; of the lower floret 6-7 mm. long and obtuse, of the upper slightly shorter, narrower, acute; lodicules small; anthers 3 mm. long.

A very variable grass, especially in so far as the pubescence on the inflorescence is concerned. A common grass in dry places in the hills and foothills. It can be made into a good hay provided the awns can be extracted. Common in dry places, plains and hills.

28. THEMEDA Forsk.

Spikelets 2-nate (the terminal 3-nate) those of the lower 2 pairs alike in shape and sex, male or neuter, sessile to sub-sessile and closely approximate so as to form an involucre, of the following pair or pairs differing in sex and conspicuously so, in shape, one of each pair sessile, the other pedicelled on the rhachis of solitary racemes terminating the culms and their upper branches; rhachis terete, tough, or tardily disarticulating and glabrous between the homogamous pairs, readily disarticulating below the fertile spikelets; homogamous pairs or at least their sessile members persistent, the spikelet of the heterogamous pairs falling separately, the pedicelled with the pedicel, the sessile with the adjacent joint (if more than one) and the base or bases of the adjoining pedicels. *Florets* 2, lower reduced to an empty lemma, upper male or neuter in the homogamous spikelets and the pedicelled members of the heterogamous pairs, hermaphrodite in the sessile members of the latter. *Fertile spikelets* terete, awned or awnless; callus usually acute to pungent, densely bearded, beard more or less concealing the adjacent joint or pedicel bases. *Glumes* equal, coriaceous except at the membranous tips; lower tightly involute, quite keelless, nerves very fine, obscure except in transmitted light, the upper with a deep longitudinal groove on each side. very firm between these, thin along the margins, 3-nerved. *Lemma* of lower floret hyaline, nerveless, of upper floret stipitiform from a 1-nerved, hyaline base, cartilaginous up-

wards and passing into a short geniculate awn, or hyaline and 1-nerved throughout, with the nerve becoming stouter upwards and passing into a narrow, more or less reduced awn or awnless. *Palea* hyaline, nerveless, small or 0. *Lodicules* 2, somewhat large, glabrous. *Stamens* 3. *Stigmas* exserted, sub-terminal or from near the middle of the floret. *Caryopsis*, linear-obovate, sub-terete, grooved on the face; embryo about half as long as the grain. *Involucral spikelets* dorsally much compressed, awnless. *Lower glume* more or less herbaceous 2-keeled; upper membranous, very rarely suppressed. Both florets present or one or both suppressed; their lemmas hyaline, the upper with or without a palea. *Pedicelled spikelets* of the heterogamous pairs similar to those of the homogamous pairs, but narrower.

Annual or perennial usually coarse grasses, with scanty to compressed or decompound, spatheate panicles and scattered, or more or less crowded and often glomerate, short, 1-2- (very rarely 3-) nerved, awned or awnless racemes of spikelets.

Key to the species of *Themeda*.

Pairs of involucral spikelets inserted at the same level, 5-10 mm. long.

Sessile spikelets solitary in raceme.

Racemes in densely congested heads, awns 30-60 mm; involucral spikelets 6-10 mm. long.

1. *T. triandra*.

Racemes loosely scattered, awns 30-35 mm.; involucral spikelets 5-6 mm. long.

2. *T. laxa*.

Sessile spikelets 2 in each raceme.

3. *T. strigosa*.

Pairs of involucral spikelets inserted at different levels.

Involucral spikelets glabrous or nearly glabrous.

Fertile spikelets with an imperfect awn or awnless.

4. *T. villosa*.

Fertile spikelet with a well-developed geniculate awn.

5. *T. caudata*.

Involucral spikelets bearing fulvous, tubercled-based hairs.

Fertile spikelet with well-developed geniculate awns.

Stout grasses.

Column of awn 3.75-5 cm. long; involucral spikelets 12-20 mm. long.

6. *T. arundinacea*.

Column of awn 2·5 cm. long, involucre	..	7.	<i>T. subsericans.</i>
spikelets 11-12 mm. long.	..	8.	<i>T. huttonensis.</i>
Slender, wiry grass.	..	9.	<i>T. intermedia.</i>
Fertile spikelets awnless.	..		

1. Themeda triandra Forsk., Flor. Aegypt.-Arab. (1775) 178. Syn. *T. forskalii* Hack., Mon. Androp. (1889) 659.

Perennial. *Culms* erect or geniculate ascending, rounded or moderately compressed, slightly striate, leafy and branchy to the base, very glabrous. *Leaf-blades* linear, rounded at the base, insensibly contracted to the tips, acuminate or rarely slightly obtuse, rigid, spreading, the adult leaves flat, the median nerve fine, acute below; sheaths more or less compressed, keeled, the upper spathe-like, dilated, with the limb exceeding the raceme, the lower exceeding the internodes; ligules 1·1·5 mm. long, rounded, truncate, membranous, reddish, ciliate.

Inflorescence a leafy panicle, narrow, often nodding at the top; lower branches solitary, rather long, the lower bare for some distance, the upper in twos or threes, all filiform, very glabrous, flower bearing branches crowded towards the summit, racemes in obconical or broadly ovate fascicles, rarely sub-globose, crowded; spiciform racemes 12-17 mm. long with a peduncle 1 mm. long in the spathe. *Spatheoles* lanceolate, long attenuate, boat-shaped, keeled, compressed, with scarious margins, many-nerved. *Involucral spikelets* all sessile, lanceolate or linear-lanceolate acute or acuminate, rarely cuspidate, 8-10 mm. long, persistent; callus very short, gibbous, glabrous; lower glume keeled, often more or less scarious-marginate on one side, 9-11-nerved, glabrous or with rigid, appressed hairs tubercled at the base; upper glume lanceolate, acute. *Lower floret*; lemma oblong, acute or obtuse. *Anthers* 4-6 mm. long, rarely absent. *Sessile spikelets* hermaphrodite, one in a raceme, enclosed in the involucre, linear-oblong, sub-cylindrical, 7-10 mm. long; callus acute, curved 2·5-3 mm. long, glabrous in front, with reddish hairs on the sides, finally purplish-black, the length of the spikelet; lower glume 7-10 mm. long, coriaceous, very obtuse, often emarginate, margins broadly involute, back smooth to the

base, shining, tubercular-scabrid at the top or channelled, finally 7-nerved; upper glume 7-10 mm. long, linear-oblong, very obtuse, glabrous, scabrid above, 1-nerved. *Lower floret*; lemma 4·7-7·5 mm. long, lanceolate, acute, glabrous, nerveless; upper floret; lemma 1-nerved; awn 3-6 cm. long; column hispid, brownish. *Anthers* 2 mm. long. *Styles* at least shorter than the stigmas. *Pedicelled spikelets* similar to the involucre spikelets, subulate, lanceolate, very acute, glabrous, consisting of two glumes and one lemma.

A valuable fodder before flowering. Common in the KHASI and NAGA HILLS, 3-4,000 ft.

2. *Themeda laxa* *A Camus* in Bull. Mus. Hist. Nat. Paris, XXVI, 266, 423, 1920. Syn. *Anthistiria laxa* Anderss. in Nov. Act. Sc. Upsal. ser. III. 2 (1856) 243.

Perennial. *Stems* tufted, slender, much branched, 60-120 cm. high, very leafy, smooth and glabrous, much branched. *Leaves* linear, up to 15 cm. long by 5 mm. wide, smooth and glabrous on the upper surface, a few scattered hairs on the lower surface, margins scabrid, with a few very long cilia 4-5 mm. long, base slightly but abruptly contracted; sheaths rather loose and compressed and spathe-like, soon fading and turning reddish brown; ligule absent.

Panicle slender consisting of fan-shaped fascicles or clusters of racemes about 1·25 cm. in diameter. *Spathole* long acuminate, very narrowly cymbiform, 2·5-3·5 cm. long, hispid-scabrid on the margins. *Spikelets* of the involucre homogamous, male or neuter, 5-6 mm. long, often reddish with a green, glabrous callus; lower glume narrowly oblong, tip almost spinously acute, nerves 9-11, distant, back with scattered tubercles, each with a long white hair, chiefly on the upper half and often few in number; upper glume 5 mm. long with a fine median nerve and two to three nerves in each margin, margins narrowly inflexed, ciliate; lemma as long, hyaline; lodicules cuneate, micro-ciliate on the truncate end. *Palea* sometimes present as a minute scale. *Sessile spikelets* one, 4·25 mm. long (including the bearded callus); pedicelled spikelets 2·5 mm. long, tapering at the base into short pedicels. *Lower glume* of the sessile spikelet truncate,

obscurely 9-nerved, upper fourth of the glume closely scabrid-hispid. *Upper glume* narrower, longer, with incurved margins and rounded keel in which lies the awn of the upper lemma. *Lower floret*; lemma hyaline, linear, about 3 mm. long. *Upper floret*; lemma reduced to the hyaline base of a rarely smooth awn, 3.3-5 cm. long; lodicules very large, oblong-obcuneate. *Ovary* linear-oblong. *Pedicelled spikelets* very narrow, very sharply acute; lower glume many-nerved; upper scaberulous on the keel, margins ciliate inflexed.

Will probably be found in the BALIPARA FRONTIER TRACT.

3. Themeda strigosa Haines, Bot. Bihar and Orissa, 1051. Syn. *Anthistiria strigosa* Ham. ex Hook. f. F.B.I. VII (1897) 214.

A stout perennial grass up to 1.5 m. tall, with terete, smooth and polished culms. *Leaf-blades* linear-lanceolate, up to 30 cm. long, ending in a filiform tip, 3-4 mm. wide, smooth and glabrous; sheaths smooth, polished, keeled, rather loose; ligule a narrow ciliate membrane.

Inflorescence a very compound panicle up to 60 cm. long, with long slender upright branches, 2-3 branches from a leaf axil, leaflets from 2.5-7.5 cm. then with a leaf-bract bearing 2-several spatheoles and often a further slender branchlet which may be again similarly branched; spatheoles and racemes not hidden among the bracts. *Spatheoles* strongly nerved or ribbed, 1-1.25 cm. long, ciliate or not on the keel, subaristate, geniculate and bearded on the peduncle. *Racemes* of 4 involucreal spikelets and two or more sessile hermaphrodite spikelets. *Lower glume* of involucreal spikelets 3-5 mm. long, oblong lanceolate, many nerved, covered with tubercle-based bristles; upper glume subaristate, 3-5 mm. long; lemma empty, narrow, hyaline. *Hermaphrodite spikelets* usually 2, pale, ciliate on the callus with light-coloured hairs; lower glume hispidulous; upper wrapped round the slender awn which is usually about 1 cm. long. *Pedicelled spikelets* usually one to the lower sessile and two to the upper sessile spikelet; pedicels 1.25 mm. long, glabrous; lower glume 3-5 mm. long, lanceolate, acuminate, bristly; stamens 3.

ASSAM, Hamilton.

4. **Themeda villosa** Dur. et Jack., Ind. Kew. Suppl. I. 424. Syn. *Anthistiria villosa* Poir., Encycl. Suppl. i. 396.

A perennial grass. *Stems* tufted, very stout, up to 20 cm. tall, smooth, glabrous, polished, often solid, leafy. *Leaf-blades* 30 cm. long or more, linear-lanceolate tapering to a narrow base, more often glabrous than not, scaberulous on both surfaces, midrib white, strongly marked, lateral nerves prominent; margins somewhat thickened and scabrid; sheaths auricled at the mouth, strongly keeled below, smooth and glabrous, rather loose, finally slipping from the culms; upper spathe-like; ligules membranous, short, 1-2 mm. long, erose, not or very shortly ciliate.

Inflorescence a very large, leafy, decompound panicle. *Spatheoles* boat-shaped, keeled, many-nerved, scabrid on the keel; tip often setaceous-scabrid, 2.5-3 cm. long. *Peduncles* terete, 1.1-1.5 cm. long, villous at the top. *Involucral spikelets* four, homogamous male, inserted in pairs at different levels; lower glume lanceolate, 10-14 mm. long, many-nerved, 2-keeled, one narrowly winged, margins inflexed, hispid-ciliate on the margins, keels scabrid, sparsely hairy with short, rufous hairs on the dorsal surface or almost glabrous; upper glumes somewhat shorter than the lower glume, hyaline, 3-nerved, ciliate on the margins, nerves and bark scaberulous or shortly hairy; lemma 9 mm. long, lanceolate, ciliate on the margins; palea narrow ciliate; stamens three, anthers 5 mm. long.

Central racemes of two sessile and three pedicelled spikelets. *Sessile spikelets* 7-8 mm. long; callus densely hispid with short brown hairs; lower glume 7-8 mm. long, lanceolate-oblong, tip broadly truncate, margins inflexed, keels rounded, densely covered on back and sides with appressed short brown hairs, 7-8-nerved; upper glume 7 mm. long, narrowly lanceolate, 3-nerved, curved to the awn, tip obtuse, densely hairy on the dorsal surface. *Lower floret* barren; lemma 5.5 mm. long, lanceolate, hyaline; palea minute. *Upper floret* hermaphrodite; lemma lanceolate-acute, 6 mm. long, hispid on the keel; awn stout, short, 7 mm. long or absent. *Pedicelled spikelets* male; pedicels 3 mm. long ciliate-hispid on angles and back with brown hairs. *Lower glume* narrowly lanceolate-acuminate, 10-15 mm. long, 13-nerved,

scabrid on the nerves, sparsely hairy on the dorsal surface; upper glume 5-nerved, translucent, ciliate on the margins in the upper half, 8 mm. long, almost aristate; lemma 7-8 mm. long, hyaline, ciliate on the margins; palea shorter, hyaline, obtuse. *Stamens* 3, anthers 4-5 mm. long.

Common all over the province up to 5,000 ft.

5. Themeda caudata Dur. et Jack., Ind. Kew. Suppl. I. 424. Syn. *T. gigantea* Hack. sub-sp. *caudata* Hack., Mon. Androp. (1889) 676.

A very large caespitose grass from a stout root-stock with flattened stems, 3-6 m. tall. *Culms* greenish-yellow or pinkish. *Leaf-blades* linear, tapering to a fine point, equitant below, up to 1.5 m. long by 8-16 mm. wide, midrib broad and flat on the upper surface, surfaces glabrous, somewhat rough, glaucous below; margins scabrid; sheaths very smooth, striate and glabrous, ligule a very narrow ciliate ring, convex upwards.

Spathes and their spatheoles forming a very large, leafy and pendulous, compound panicle. *Spatheoles* 3.25-5 cm. long, finely acuminate, many nerved, glabrous, on slender peduncles enclosed with others and a branch in a spathe, these with other peduncles and branches in spathes of a lower order and so on. *Involucral spikelets*, 6-4 mm. long, in somewhat unequal pairs, one pair with longer calli than the others, one of each pair apparently often empty, the other staminate. *Lower glume*, long, subulate sub-aristate, one margin much inflexed and its keel scantily ciliate and scabrid; back flat, scaberulous, about 9-nerved. *Upper glume* three quarters the length of the lower, 3-nerved, with an additional nerve on the margin, scaberulous; the lemmas of the floret sub-similar, hyaline. *Anthers* nearly as long as the spikelet. General raceme of 2 sessile spikelets and 2-3 pedicelled. *Sessile spikelet* with an oblique, densely brown-bearded, ultimately pungent callus, falling with its joint and pedicelled spikelet; lower glume very coriaceous, nearly covering the upper, 11-nerved; upper with hirsute keel and involute coriaceous margins; *lemmas* of the lower floret three quarters the length of the glume, empty; upper floret hermaphrodite; lemma

similar to the lower lemma, hyaline. *Lodicules* very large, oblong-lanceolate. *Caryopsis* firm, oblong, brown, 3.5 mm. long.

Plains of ASSAM.

6. *Themeda arundinacea* Ridley, Flor. Malay Penin. V. (1925) 212. Syn. *T. gigantea* Hack. sub-sp. *arundinacea* Hack., Mon. Androp. (1889) 672.

A tall tufted perennial grass. *Culms* up to 6 m. tall, smooth and polished, solid, 1.5 cm. in diameter, compressed. *Leaves* linear, gradually attenuate towards the base, tapering to a subulate tip, rough on both surfaces, very scabrid on the margins up to 1 m. or more long, 1.1-1.5 cm. wide; sheaths strongly keeled, smooth and glabrous, auricled, striate, often loose; ligule a membranous ring.

Inflorescence erect with nodding tip, very large, consisting of numerous compound racemes issuing from lanceolate-acuminate spatheoles 3-8 cm. long; peduncle in the spatheole short, hairy, 10 mm. long, swollen at the apex. *Involucral spikelets* inserted at different levels; 16 mm. long; lower glume 16 mm. long, lanceolate, covered all over the back with golden hairs from tubercle bases, 2-keeled, one margin more inturned than the other, many- and closely- nerved; upper glume a little shorter, 3-nerved, chartaceous, acuminate; lemmas 2, male or not. *Sessile spikelets* 8 mm. long, dark brown; callus sharp, bearded with brown hairs, 4 mm. long; lower glume oblong acute, 2-toothed, rich brown in colour, smooth and glabrous or sparsely hairy on the back, hairy on the sides at the top; upper glume as long as the lower and of the same texture. *Lower floret* empty; lemma hyaline. *Upper floret* hermaphrodite; lemma the hyaline base of a very stout awn which is up to 5 cm. long. *Pedicelled spikelets* seated on pedicels 3 mm. long; similar to the involucral but much more slender and delicate, covered on the back with numerous tubercle-based hairs.

A very common grass in savannah in the plains.

7. *Themeda subsericans* Ridley, Flor. Malay Penin. V. (1925) 212. Syn. *T. gigantea* sub-sp. *arundinacea* var. sub-

sericans Hack., Mon. Androp. (1889) 674; Anthistiria subsericans Nees apud Steud., Syn. Pl. Glum. (1854) 401.

A perennial grass up to 1 m. tall with leafy culms more or less hairy below the upper nodes. *Leaf-blades* linear-acuminate, tapering from the base to a fine point, rough on both sides, scabrid on the margins, hairy on the lower surface towards the base; sheaths scabrid and hairy; ligule a short membrane.

Inflorescence a panicle of compound racemes seated on peduncles concealed in spatheoles. *Involucral spikelets* male or neuter, 11-12 mm. long, covered on the back with numerous long, golden or rufous hairs; lower glume narrowly elliptic-acuminate, margins incurved, 2-keeled; upper glume rather more delicate, 3-nerved; lemmas 2, male or neuter, paleate or not. *Sessile spikelet* 10 mm. long, densely brown hairy; awn 2.5 cm. long, hispid on the column. *Pedicelled spikelets* similar to the involucral but rather narrower and more delicate.

DUMPEP, KHASI HILLS, 4,000 ft. and doubtless elsewhere.

8. Themeda huttonensis Bor., Ind. For. Rec. (Bot.) I. 3 (1938) 95.

Perennial, 60-100 cm. tall; culms slender, sub-terete or compressed, so much so as to be 2-keeled, smooth and glabrous, often markedly zigzag, much branched, in the upper part branched from each node. *Leaf-blades* linear, setaceous-acuminate, rounded at the base, up to 20 cm. long by 8 mm. broad, glabrous on the lower surface, scabrid on the margins and on the lower surface, with tubercle-based, long white hairs on the upper surface and margins near the base (4 mm. long); sheaths loose, strongly compressed and keeled, contracted towards the top; ligule membranous, convex upwards, very narrow to 1.5 mm. long, erose.

Inflorescence a very leafy panicle; flower bearing branches arising at a node within a leaf sheath bearing a reduced limb; dividing at each successive node upwards into 1-2 or 3 branches, limb of the sheath or spatheole gradually

getting smaller upwards; internodes long and therefore the panicle very lax and loose; ultimate spatheoles 2.5-3 cm. long, often with a minute limb, scabrid on the margins. *Spatheoles* compressed or cymbiform, lanceolate, acuminate, glabrous. *Racemes* solitary on a peduncle 1 cm. long, glabrous, usually with 2-fertile florets, seated in an involucre of 4 homogamous spikelets and with 2-pedicelled spikelets to each sessile (rarely only one). *Fertile spikelet*, including the callus, 5.5 mm. long; callus acute, densely bearded; pedicel bases inserted on the callus, 2 mm. long or shorter, glabrous, articulation oblique. *Lower glume* chartaceous, oblong-truncate, 11-nerved, smooth and shining in the lower three quarters, scabrid at the top, margins strongly involute. *Upper glume* chartaceous, margins involute, linear, oblong, contracted towards the truncate tip, 1 central nerve and 3 marginal, strongly depressed and clasped by the lower glume on each side of the central nerve, glabrous; lower floret empty; lemma linear-lanceolate, 4.5 mm. long, margins slightly involute, ciliate on the margins, hyaline, nerveless; upper floret hermaphrodite; lemma 1-nerved, hyaline, forming the base of a stout, scabrid awn up to 2.5 cm. long; palea absent or a minute, hyaline scale; lodicules 2, large, oblong scales; ovary glabrous; styles connate into a column; stigmas exerted laterally (?). *Involucral spikelets* 11-12 mm. long, inserted at different levels, oblong-lanceolate to linear-lanceolate, persistent; glumes sub-equal in length; lower herbaceous, convex on the back, with a few tubercle-based long hairs (4 mm.), 2-keeled near the margin, narrowly winged on the keel, margins narrowly involute, many nerved; upper glume membranous, narrowly ovate-lanceolate, acuminate, 3-nerved, margins involute and ciliate in the upper half. *Pedicelled spikelets* falling from the pedicels with a shortly bearded pungent callus, similar to the involucral spikelets except that they are glabrous and narrower; lower floret; lemma 6.5 mm. long, hyaline, 1-nerved, margins involute, ciliate on the upper half; upper floret; lemma linear-oblong-lanceolate, abruptly contracted into a very short bristle.

Common near LARURI, NAGA HILLS, 2,000 ft.

9. *Themeda intermedia* Dur. et Jack., Ind. Kew. Suppl. I. 424. Syn. *T. gigantea* Hack. sub-sp. *intermedia* Hack., Mon. Androp. (1889) 675.

A very tall grass up to 5 m. *Culms* smooth and polished, glabrous, solid, up to 1.5 cm. thick. *Leaf-blades* almost petioled, with the midrib very broad and grooved on the upper surface at the base, up to 1 m. long by 1.5 cm. wide, very scabrid on the margins and on both surfaces, glabrous; sheaths strongly keeled in the upper half, much shorter than the internodes above, rather loose, striate, smooth and glabrous; nodes bare; ligule a membranous ring.

Inflorescence a large nodding panicle of peduncled racemes of spikelets issuing from spatheoles. *Involucral spikelets* inserted at different levels, oblong-lanceolate, acuminate, tip often oblique; lower glume 13 mm. long, shape of the spikelet, with slightly inturned margins, many-nerved, covered on the back with numerous tubercle-based hairs; upper glume 10-12 mm. long, 3-nerved, membranous, minutely scabrid on the dorsal surface in the upper half; lower lemma hyaline, 1-nerved, 10 mm. long, epaleate, upper lemma hyaline, 1-nerved, 10 mm. long, epaleate or not, containing 3 stamens with linear anthers 8 mm. long. *Sessile spikelets* 10 mm. long, including the callus which itself is 2 mm. long, blunt and bearded with brown hairs; lower glume coriaceous, flat on the back, covered with brown hairs, oblong acute; upper glume of the same texture but glabrous on the inturned margins, lemma hyaline, the upper carrying a short bristle or awnless. *Pedicelled spikelets* like the involucral seated on pedicels 2-2.5 mm. long.

Fairly common in the KHASI and JAINTIA HILLS, 2,500-4,000 ft.

29. GERMAINIA Balansa et Poitrasson.

Racemes contracted into a terminal capitulum which is solitary, narrowly oblong, often long exerted from the uppermost sheath, not articulated with the peduncle, consisting of from 9-14 spikelets composed of two pairs of homogamous spikelets at the base, forming a false involucre, which are erect, crowded, sessile, muticous, each containing

2-diandrous male flowers; spikelets 2-3-nate, of which one is pedicellate, female and one-flowered and awned, and 1 or 2 sessile spikelets, 2-flowered and male, muticous, and at the top 1 terminal pedicelled, awned, female spikelet with or without 2 lateral spikelets. *Male spikelets* muticous; lower glume coriaceous, truncate, many nerved, convex on the dorsal surface; upper glume hyaline, membranous, rather longer, terete, narrower, narrowly lanceolate, 3-nerved. *Lower floret*; lemma hyaline, narrowly lanceolate, 1-nerved; palea present or absent. *Stamens* 2. *Upper floret*; lemma hyaline, lanceolate often mucronate; the palea as long, stamens 2, anthers long. *Female spikelets* awned, much smaller than the male, cylindrical, obliquely inserted on a pedicel with a bearded callus; lower glume papyraceous, linear, truncate, enclosing the obtuse upper glume which is similar but shorter. *Lower floret*; lemma hyaline, with a long awn scarcely dilated at the base; palea short, very broad, erose; lodicules 0. *Stamens* 0; styles short, slender; stigmas linear, long, narrow, exserted from the summit of the spikelets.

Perennial grasses with rigid stems and narrow leaves.

Germainia khasyana Hack. in Oestr. Bot. Zeitschr. XLI (1891) 50.

Perennial. *Culms* erect and ascending, 20-30 cm. tall, densely tufted and leafy, pruinose below the nodes, slender. *Leaf-blades* linear-acute, 3-4 cm. long, 2-3 mm. broad, rather rigid, flat, with scattered long white cilia on the margins and a few on the lower surface, all from tubercle-bases, otherwise glabrous, tapering gradually to a point, hardly or only slightly narrowed at the base; sheaths longer than the internodes, lax, hairy, hairs caducous, sparsely hairy on the nodes, old sheaths not collected at the base of the plant; ligules broadly ovate, 1.5-2 mm. long, glabrous, decurrent into the margins of the sheaths.

Inflorescence 1.2-1.4 cm. long, not including awns, linear-oblong made up of four male, 2-flowered spikelets forming an involucre, then with spikelets in groups of 2, each group with one pedicelled female and 1 or 2 sessile male, the male similar to the involucre spikelets but 1-flowered or

neuter, and with a narrower lower glume. *Involucral* spikelets inserted in twos, separated by a node about 1 mm. long; of the four, two are sessile and one pair on pedicels 6-8 mm. long, erect, appressed; lower glume 12-14 mm. long, coriaceous, broadly linear-oblong, tip broadly truncate, ciliate, margins not implicate, polished and shining; upper glume nearly as long, narrowly lanceolate, obtuse, 3-nerved; margins involute, glabrous; lower floret male; lemma like the upper glume, obscurely 3-nerved; palea oblong, broad, 2-nerved, broadly involute; upper floret male; lemma 11-13 mm. long, narrowly linear, very acute, mucronate, hyaline, membranous, glabrous, nerveless; palea equal in size, narrower and sharper. *Stamens* 2. *Female spikelet*, 8 mm. long, (accompanied by one or two male lateral spikelets) linear, sub-cylindrical, brownish, with a callus 2 mm. long, very acute, curved, enveloped in yellow brown hairs; lower glume very obtuse, 3-lobed, 3-nerved, the lateral uniting with the median under the summit at right angles, hairy, reddish on the back; upper glume similar to the lower. *Lower floret*; lemma 6.5-7 mm. long, hyaline, truncate, denticulate, ciliate at the top, nerveless. *Upper floret*; lemma membranous, linear, 1-nerved, terminating in a thick awn up to 6.5 cm. long, robust, with a brownish column covered with grey hairs. *Stigmas* about 6 mm. long, densely, though shortly, plumose.

KHASI and JAINTIA HILLS—Nartiong, 4,000 ft., Puriung, 4,500 ft.

Very common in marshes near Myntliah, 16 miles beyond Nartiong on the Nowgong road.

30. ISEILEMA Anderss.

Panicle large about half the length of the stem; branches usually fascicled and interspersed with scarious spathe-like bracts; proper spathes boat-shaped, acute, compressed, more or less herbaceous on the back, many-nerved with scarious margins; racemes fasciculiform, solitary at the apex of the stem and branches, articulate with the peduncle below the lowest spikelets, at length all falling away from it. *Spikelets* dimorphous, the lower whorled, male or neuter, forming an involucre round the inarticulate rhachis. *Involucral spikelets*

pedicellate; pedicels short flattened; lower glume oblong-lanceolate, 3-5-nerved; upper glume similar, 3-nerved; lemma hyaline, 1-nerved. *Lodicules* cuneate, retuse. *Anthers* violet. *Pedicellate spikelets* on long slender pedicels, similar to the involucre. *Fertile spikelets* lanceolate to linear-lanceolate; lower glume truncate, or shortly 2-fid at the tip; upper glume as long, muticous, hyaline, glabrous. *Lower floret*; lemma small, hyaline, sometimes absent. *Upper floret*; lemma reduced to the stipitate base of an awn longer than the spikelet.

Small annual or perennial grasses; stems slender, compressed, many noded. *Leaves* linear from a usually rounded, equilateral base; sheaths compressed, keeled, shorter than the internodes.

Iseilema prostratum Anderss., Nov. Act. Soc. Sc. Upsal. Ser. 3. ii (1858) 251. Syn. *I. wightii* Anderss., loc. cit.

Culms often prostrate and rooting at the base, finally ascending, 20-80 cm. long, leafy, branched below. *Leaf-blades* acute, 6-12 cm. long, 2-3 mm. broad, glaucescent or sometimes they and the whole plant reddish, glabrous, rather smooth below, above scabrid or very scabrid; sheaths loose, more or less bearded at the nodes, for the rest very glabrous or scaberulous or occasionally, the sheath subtending flowering branches with sparse spreading tubercle-based hairs; spathes always scabrous, with the keel more obviously tubercled; ligule short, truncate, membranous, ciliate.

Panicle occupying half the culm or more, linear oblong, rather dense, sub-interrupted, erect spreading, decompound in typical specimens; rhachis with bearded nodes; proper spathes 8-13 mm. long, linear-lanceolate, with scarious margins. *Involucrat spikelets* male or neuter, 3-3.5 mm. long, shortly pedicellate (pedicels bearded at the base) strongly compressed, lanceolate oblong, green or tinged with violet; lower glume sub-acute with five strong ribs on the back sulcate between the ribs; often verrucose beside the keels; upper glume glabrous with broadly inflexed margins, 1-nerved, long ciliate on the margins, nerve sometimes verrucose, lower floret absent; upper floret male; lemma about as long as the

glume or shorter, 2-3-toothed, nerveless, glabrous. *Anthers* 1.5-2 mm. long. *Pedicelled spikelets* on very slender pedicels half as long as the sessile, male or neuter resembling the involucre but more delicate. *Sessile spikelets* hermaphrodite, 1.5-3 mm. long, lanceolate; lower glume acute, obscurely 4-nerved; margins broadly inflexed, keels scaberulous, glabrous; upper glume equalling the lower in length, elliptic-lanceolate, acute or obtuse and mucronate, dorsum obliquely carinate; keels scabrid; lower floret neuter, lemma a narrowly linear hyaline scale; upper floret hermaphrodite; lemma reduced to the base of a stout awn; palea absent.

So far not collected in Assam but is likely to occur.

31. DIMERIA R. Br.

False spikes solitary, geminate or fascicled, often slender, unilateral, simple; rhachis inarticulate, tough, trigonous or flattened, pedicels very short, erect or appressed, sub-claviform; articulation straight. *Spikelets* numerous, solitary, homogamous with one hermaphrodite floret, often aristate, sometimes accompanied by the rudiments of a lower floret, laterally and strongly compressed, appressed laterally to the rhachis, articulate on short pedicels, linear or linear-oblong, callus often short, shortly or very shortly bearded, whitish. *Glumes* rather rigid; lower papyraceous or coriaceous, often narrowly linear, rounded on the back, keeled, muticous, spreading at anthesis, 1-nerved; upper glume similar, often longer and broader. *Lower floret* neuter; lemma empty, hyaline, often rolled lengthways, small, linear or oblanceolate, often nerveless and ciliate, without a palea. *Upper floret* hermaphrodite; lemma hyaline or rather rigid towards the insertion of the awn, rolled, carinate, 2-toothed or 2-lobed, rarely entire, 1-nerved, with a twisted awn inserted in the sinus; palea small or absent; lodicules absent or very small. *Stamens* often 2, one anterior, the other posterior, rarely 3; filaments short. *Styles* short, distinct; stigmas shortly exerted laterally towards the base of the spikelets. *Caryopsis* linear, laterally compressed, included in the lemma but free; embryo about $\frac{1}{3}$ the length of the grain.

Usually slender herbs, with narrow leaves.

Key to the species of *Dimeria*.

Perennial	..	..	..	..	1. <i>D. fuscescens</i> .
Annual.					
Rhachis hairy	..	..	..	..	2. <i>D. kurzii</i> .
Rhachis glabrous :—					
Rhachis .5 mm. wide; upper glume					
2.5 mm. or more long	..	..	..	..	3. <i>D. ornithopoda</i> .
Rhachis .3 mm. wide; upper glume					
2 mm. long	..	..	..	..	4. <i>D. tenera</i> .

1. *Dimeria fuscescens* Trin., Mem. Acad. Petersb. ser. 6. 2 (1833) 335.

Culms 30-50 cm. tall, slender, narrowly fistular. *Leaf-blades* linear-acuminate, 5-9 cm. long, 3-4 mm. broad, rigid, insensibly tapering to join the sheath, setaceous-acuminate or not, glabrous or densely hairy in both surfaces; margins scabrid, often conspicuously ciliate near the base from tubercle bases; sheaths tight or lax, lower often scarious, glabrous or very densely hairy, smooth, hardly striate.

False spikes or racemes geminate or 3-nate, 4-10 cm. long, more or less robust, pedicelled, fuscous, sparsely hairy, dense-flowered; rhachis .6 mm. broad, depressed trigonous, more convex on the ventral surface than above, wing represented by a narrow ridge, glabrous but scabrid along the ridge, internodes 2-3 mm. long, equal. *Pedicels* small, stout, scabrid. *Spikelets* violet-fuscous, 4-5 mm. long, the lower 1-8 reduced to two empty glumes, solitary, secund, bifarious, laterally strongly compressed; lower glume 4-5 mm. long, subcoriaceous, glabrous or the keel spinulose-scabrid, scabrid on the back; upper glume linear-lanceolate, apex shortly acuminate, margins hyaline-membranous, 4 mm. long. *Lower floret* neuter; lemma obovate, 2.5-3 mm. long, obtuse, ciliate. *Upper floret* hermaphrodite; lemma 2.5-3.4 mm. long, 2-toothed, hyaline; awn inserted in the sinus, 4-8 mm. long; anthers 2.25 mm. long. *Caryopsis* 3.5 mm. long.

Common, 4-5,500 ft. in marshy places, KHASI and JAINTIA HILLS and NAGA HILLS.

2. *Dimeria kurzii* Hook. f. F.B.I. VII. (1897) 103.

Annual. *Culms* ascending, branchy, very slender, long exserted at the summit, 30 cm. tall. *Leaves* linear-acute,

5-7 cm. long, 2-2.5 mm. broad, hairy above, hairs spiny and stiff below, margins scabrid; median nerve rather marked, two lateral nerves on each side; sheaths narrow, tubercle-based hairs numerous towards the top, glabrescent at the base; ligules very short, membranous.

Inflorescence a raceme, 3-5 cm. long, sometimes more or less curved, of 50-70 spikelets; rhachis .75-.9 mm. broad, back glabrous; margins densely and rigidly ciliate; internodes equal, less than half the length of the spikelet; pedicels almost absent, reduced to a strongly bearded callus. *Spikelets* 2.5 mm. long; glumes sub-erect, lower papyraceous, membranous, oblong, mucronulate, with sparse hairs on the back, margins longly and densely ciliate; upper oblong-acute, more or less ciliate, papyraceous with membranous margins. *Lower floret*; lemma oblong-lanceolate. *Upper floret* hermaphrodite; lemma hyaline, ovate, two-lobed from the upper third, glabrous, awned; lobes acute; awn 15-18 mm. long, twisted, kneed, glabrous, rather scabrid, column shorter than the bristle. *Caryopsis* cylindrical.

NAGA HILLS, LARURI, 3,000 ft.

3. *Dimeria ornithopoda* Trin., Fund. Agrost. (1820)
167. t. 14.

An annual. *Culms* very slender, branchy, sub-compressed, bearded at the nodes. *Leaves* rather soft, narrow, linear, setaceous-acuminate, glabrous or with tubercle-based soft hairs on both faces, 2-7 cm. long, 1-2 mm. broad; principal lateral nerves 1-2 on each side, the secondary few; sheaths keeled, shorter than the internodes, glabrous or hairy at the summit.

Spikes 2-3-nate, sessile, spreading or erect, reddish or brownish, 2-4 cm. long, glabrous or nearly so; rhachis sub-undulate, almost .5 mm. wide, glabrous; back smooth, flat, with a strong nerve, scabrid on the margins, keel very smooth; internodes sub-equal, 1.2-1.5 mm. long, shorter than the spikelets; pedicels small, very glabrous, .3 mm. long. *Spikelets* linear, 1.5-2 mm. long; callus bearded, reddish, .4-.5 mm. long; lower glume shorter than the spikelet, coriaceous, chartaceous towards the keel, often

membranous towards the margins, much spreading at anthesis, narrowly linear, obtuse or acute, keel scabrid, margins often ciliate; upper glume as long as the spikelet, papyraceous, acute or abruptly acuminate, twice as broad as the lower, keel puberulous, sometimes with stiff hairs, margins ciliate. *Lower floret*; lemma short, sometimes very much reduced, narrowly linear-acute, nerveless, glabrous. *Upper floret* hermaphrodite; lemma 1.5 mm. long or shorter, oblong-acute, shortly 2-toothed, glabrous; awn slender 9-10 mm. *Stamens* .6 mm. long. *Style* twice as long as the stigmas. *Caryopsis* 2 mm. long.

A very common grass in the hills, 3-5,000 ft.

4. **Dimeria tenera** Trin., Mem. Acad. Petersb. ser. 6. ii. (1833) 335.

This is a very slender species very similar to *D. ornithopoda* Trin. but smaller in all its parts. Common in the hills and foothills.

32. ISCHÆMUM Linn.

Racemes spiciform, solitary or geminate, often digitate, rarely fascicled or sub-paniculate, compressed; rhachis fragile, compressed, many-jointed, often somewhat thick. *Spikelets* 2-nate, similar or different in form or sex, the one pedicelled, falling at last from the pedicels; the other sessile, finally falling together with the contiguous joint of the rhachis, all 2-flowered, the lower floret often male, rarely hermaphrodite, the upper hermaphrodite, often male in the pedicelled spikelet, both spikelets awned or muticous, slightly dorsally compressed or the pedicelled appearing to be laterally compressed, one of the sides being more or less suppressed. *Sessile spikelets*; callus obtuse, often broad; glumes equal or almost so; lower glume papyraceous or coriaceous, muticous, margins infolded, more or less keeled, with back almost flat; upper glume of the same consistence, concave, keeled at least at the top, sometimes awned. *Lower floret* often male; lemma membranous, papyraceous or hyaline, muticous; palea narrow, often ciliate. *Upper floret* hermaphrodite; lemma hyaline or membranous, often bifid, awned or mucronate, very rarely muticous, often 3-nerved, nerves confluent towards the origin of the awn; paleas hyaline, nerveless

or rarely 2-nerved. *Lodicules* quadrangular, cuneiform. *Stamens* 3, those in the hermaphrodite flower sometimes reduced. *Stigmas* oblong or linear. *Pedicelled spikelets* often broader and rudimentary; upper glume with a keel which looks median but is actually lateral. *Upper floret*; lemma often muticous, rarely as in the sessile spikelet.

Often perennial plants of wet places. *Culms* usually decumbent at the base. *Leaves* often rolled in youth, then flat.

Key to the species of *Ischæmum*.

Lower glume of sessile spikelets with nodules and rugosities :—

Perennial; nodules marginal. 1. *I. imbricatum*.

Annual; rugosities transverse. 2. *I. rugosum*.

Lower glume of sessile spikelet without nodules or rugosities :—

Lower glume of sessile spikelet winged above the middle; upper glume keeled and winged :—

Wings broad; margins of lower glume expanded in the lower half and incurved; spikelets 4.5-5 mm. long. 3. *I. aristatum*.

Wings narrow; margins of lower glume not expanded; spikelets 6-7 mm. long. 4. *I. hubbardii*.

Lower glume of sessile spikelet wingless; upper glume keeled but not winged :—

Spikelets 6-7 mm. long; callus 1.5 mm. long; stout grass. 5. *I. hirtum*.

Spikelets 2.5-4 mm. long; callus .5 mm. long; slender grass. 6. *I. timorense*.

1. *Ischæmum imbricatum* Stapf ex Ridley, Flor. Mal. Pen. V. (1925) 200. Syn. *I. aristatum* var. *imbricatum* Hack., Mon. Androp. 203; Hook. f., F.B.I. VII (1897) 127. (not of Linn.).

Perennial. *Culms* .3-1.2 m. tall, robust or slender, erect or decumbent, then ascending, almost compressed, often branchy at the base, thickened under the inflorescence. *Leaf-blades* linear-lanceolate or lanceolate, acuminate, the upper rarely somewhat cordate, the others narrow at the base, flat, rigid, 10-25 cm. long, 6-25 mm. wide, glabrous or with silky hairs, margins very scabrid; sheaths somewhat lax, keeled at

the top, rounded at the base, glabrous or hirsute; ligules 4-8 mm. long or almost absent, finally lacerate.

Spiciform racemes 2-3, rarely erect, stout or slender, 5-12 cm. long; rhachis very fragile, with thick joints, swollen or clavate, shorter than the spikelets, densely pubescent; callus very depressed, pubescent, .8-1 mm. long. *Sessile spikelets* oblong, 6-7 mm. long; lower glume 6-7 mm. long, oblique or lanceolate, summit obliquely obtuse, often 2-toothed, coriaceous towards the base, without striæ, upper part papyraceous, 5-7-nerved, nerves anastomosing, margins narrowly inflexed, narrowly winged on the margins; wings papery and ciliate; back flat; at the base 2-4 nodular swellings often joined by transverse depressions; upper glume 6-7 mm. long, papery, ovate-lanceolate, acute or mucronate, keel scaberulous, 1-nerved. *Lower floret* male or female; lemma 5.5-6.5 mm. long, hyaline or almost so, lanceolate acute, margins inflexed, 1-3-nerved, enclosing the palea which is oblong-lanceolate, rather thick, glabrous, 2-nerved; anthers 3 mm. long. *Upper floret* hermaphrodite; lemma 4.4-5 mm. long, ovate-oblong, 1-3-nerved, bifid for one quarter or more, lobes lanceolate, acute or obtuse, with an awn 10-14 mm. long in the sinus; column brownish, glabrous, straight; palea rather shorter, oblong, glabrous, nerveless. *Caryopsis* 3.5-5 mm. long, oblong-ellipsoid, compressed. *Pedicelled spikelets* not articulate on the pedicel, dimidiate-ovate, rather smaller than the sessile, pedicel 1.2-2.5 mm. long, amorphous, thick, angular, pubescent; lower glume ovate or very narrow, acute, one margin straight, the other very broadly winged, the wing almost as big as the remainder of the glume, coriaceous, flattened, shortly pubescent, white or reddish, 7-nerved; upper glume and lower floret as in the sessile spikelets; the upper floret often male, lemma ovate, entire or 2-toothed, muticous or mucronulate, very rarely with an imperfect awn.

Very common. KHASI and JAINTIA HILLS, 4000 ft.; also in the plains.

2. Ischæmum rugosum Salisb., Ic. Stirp. Rar. (1791)
I. t. 1.

An annual. *Culms* 15 cm.-1 m. tall, erect or ascending

in robust tufts, branching at the base, branches often 2-nate, compressed, very glabrous, swollen at the top. *Leaf-blades* soft, flat, linear or almost lanceolate, base narrow and rounded, setaceous-acuminate, 5-25 cm. long, glabrous or with scattered hairs, margins very scabrid, nerves slender; sheaths lax, auricles at the throat passing into the ligule, compressed, keeled at the top, very glabrous or somewhat scaberulous, margins ciliolate, upper sheaths often aphyllous; ligules often oblong, obtuse, glabrous or ciliolate.

Inflorescence of 2 spiciform racemes, rarely one, rather large, 3-8 cm. long, erect; rhachis very fragile, joints 2.5-4 mm. thick, sub-claviform, trigonous, margins glabrous or the outer shortly and softly ciliate, not excavated at the base. *Sessile spikelet* greenish, ovate-oblong, obliquely obtuse at the summit, 3.5-6 mm. long, callus thick, silky; glumes glabrous; lower glume membranous, herbaceous, flattened, thin at the top, cartilaginous and shining at the base, rolled, back convex, rugose, with 5-6 transverse folds, margins inflexed, scabrid-ciliate, winged in the membranous part, 5-7 green nerves visible from outside, prominent and anastomosing, many-nerved inside; upper glume 3.5-6 mm. long, ovate, acute or obtuse, compressed laterally, back coriaceous, keel acute, glabrous in the centre, sinuous, slightly winged and ciliate at the top, 3-nerved, scabrid. *Lower floret* neuter; lemma 2.5-5.5 mm. long, hyaline, lanceolate, acute, margins inflexed, sub-nerved, glabrous; palea a little shorter, rather like the lemma, 2-nerved. *Upper floret* hermaphrodite; lemma 2.2-3 mm. long, hyaline, ovate-oblong, bifid for one-third or one-half the lemma, 3-nerved, lobes lanceolate; awn variable, short or long, brownish at the base; palea hyaline, ovate-lanceolate, glabrous, nerveless. *Lodicules* small, cuneiform. *Anthers* 1.5 mm. long. *Pedicelled spikelets* 2.5-4.5 mm. long, not articulate on the pedicel, half ovate (dimidiate-ovate); pedicel thick, confluent with the callus of the sessile spikelet, shorter than the spikelet, more slender than the joints of the rhachis; lower glume with a broad wing down to the lower third of the glume, whitish, scabrid, ciliolate, with 2-4 rugosities, often rather indistinct; upper glume not keeled, nor ciliate; upper floret; lemma entire, oblong, obtuse, muticous or shortly 2-toothed, awned with a perfect or imperfect awn 5 mm. long;

the remainder as in the sessile spikelet; very rarely with a more or less rudimentary floret.

Throughout the province up to 2,000 ft.

3. *Ischæmum aristatum* Linn., Sp. Pl. (1753) 1049.
Syn. I. ciliare Retz., Obs. VI (1791) 36.

Perennial. *Culms* 50-60 cm. tall, slender, erect or decumbent and rooting at the base, tufted, a little compressed, bare at the top. *Leaf-blades* rather rigid, linear or linear-lanceolate, acute, flat, base narrow, or in the upper leaves almost rounded, 5-15 cm. long, 4·5-12 mm. broad, pubescence appressed, rarely glabrescent, margins very scabrid, nerves slender; sheaths compressed, more or less keeled at the summit, lax, glabrous or hirsute; ligules 1-1·5 mm. long, membranous, truncate, ciliate.

Inflorescence of 2 spiciform racemes, rarely 3, from 3-8 cm. long, erect, spreading or almost appressed to one another, rather thick, hairs scattered; rhachis fragile; pedicels and joints excavated at the base (in the angle, so that they appear to be separated from the sessile spikelet by a pore-shaped space), 2-2·7 mm. long, trigonous, exterior angle with rigid hairs, the interior angles glabrous or shortly ciliate. *Sessile spikelets* green, reddish or splashed with violet, ovate oblong, 4·5-5 mm. long; callus very short, oblong, bearded; lower glume 3·5-5·2 mm. long, coriaceous towards the base, papyraceous towards the top, obovate-oblong, obtuse, 2-toothed, very broadly winged on each side, margins inflexed, auricled at the base, wings erose, ciliolate, back convex, the upper portion scrobiculate (sawdusty) or not, scabrid, glabrous or not, 5-7-nerved, nerves very visible below the summit; upper glume 4·5-5 mm. long, papyraceous, ovate-lanceolate, acuminate or shortly aristate, summit recurved and its keels narrowly winged, dorsally glabrous or ciliate, 3-5-nerved. *Lower floret*; lemma 3-5 mm. long, hyaline, membranous, lanceolate, acute, glabrous or ciliolate, 1-3-nerved; palea equal in length to the lemma, oblong-lanceolate, papyraceous in the centre, 2-nerved, margins incurved, thin, hyaline. *Stamens* 3; anthers 2·5-3 mm. long. *Upper floret*; lemma 2·7-3·5 mm. long, hyaline, ovate-oblong, two-lobed towards the middle,

glabrous or ciliolate, 3-nerved at the base, lobes oblong, ciliate; awn 8-12 mm. long, slender; column straight, very short, brown, hardly exserted; palea 2·5-3·2 mm. long, linear-oblong, acuminate, 2-nerved, glabrous; anthers reduced. *Style* and stigmas short. *Pedicelled spikelets* 3·5-5 mm. long, obovate; callus acute; lower glume with auricles at the base, glabrous or with sparse hairs; upper glume muticous, ciliolate, keels often hairy. *Upper floret* hermaphrodite, often aristate, the remainder as in the sessile spikelet.

Common in both valleys.

var. wallichii (*Hack.*) Bor, Ind. For. Rec. (Bot.) I. 3. (1938) 98.

Pores at the base of the pedicel of the pedicelled spikelet indistinct; joint and pedicels with yellowish golden hairs on the outer angle. *Sessile spikelets* with a callus 1·5 mm. long, with a fulvous beard, separated from the glume by a deep furrow, the latter 5·5-6 mm. long. *Upper lemma* of the pedicelled spikelet with an imperfect awn 5-6 mm. long. *Culms* over 60 cm. tall; leaves 8-15 cm. long, 6-8 mm. broad, occasionally black, hirtellous on both sides, with tubercular-based hairs at the base. *Racemes* 4-7 cm. long, lower glume of sessile spikelet long pilose above.

Plains of ASSAM.

4. *Ischæmum hubbardii* Bor, Ind. For. Rec. (Bot.) I. 3. (1938) 98.

A perennial grass. *Culms* smooth and glabrous; base strongly compressed, and covered with the old sheaths. *Lower leaves* petioled, upper auriculate, tapering to a sharp point, covered on both surfaces with tubercle-based hairs, 5-14 cm. long, up to 12 mm. broad; ligules long, lacerate.

Inflorescence of two racemes; joints of the rhachis triangular in cross section, 6 mm. long, densely ciliate on the outer edge, toothed at the top. *Spikelets* in pairs, one sessile, the other pedicelled. *Sessile spikelet*: lower glume flat or slightly convex on the back, oblong, glabrous and minutely scabrid, 6-7 mm. long, narrowly winged on the margins above the middle, purple; margins narrowly incurved, acute or two-

toothed at the top; upper glume cymbiform, 8 mm. long, keeled; keel with a very narrow scabrid wing above the middle. *Lower floret*; lemma 6 mm. long, ovate-lanceolate, hyaline, obscurely 3-nerved; margins narrowly incurved; palea oblong, acute, 4.5 mm. long, hyaline. *Upper floret* hermaphrodite; lemma 5 mm. long, cleft to the middle; lobes glabrous, acute; awn in the sinus, stout, twisted, geniculate, up to 20 mm. long; palea lanceolate, obtuse, 3.5 mm. long, hyaline. *Pedicelled spikelet*; pedicel 3.5 mm. long, concave, back rounded, densely ciliate on the back, toothed at the top. Spikelet occasionally reduced to the glumes only. *Lower glume* oblong-acute, oblique, many-nerved, purple, 5 mm. long, broadly winged on one side; upper glume cymbiform, membranous, shortly aristate, smooth and not winged on the back. *Lower floret* usually male; lemma 4 mm. long; palea 3 mm. long. *Upper floret* absent.

A common grass in the KHASI and JAINTIA HILLS, 4,500 ft.; in swamps on the plateau near Cherrapunji.

5. *Ischæmum hirtum* Hack., Mon. Androp. (1889) 228.

Culms ascending, base often decumbent, rooting at the nodes or sub-erect, robust, 30-60 cm. tall, unbranched, long exserted at the top. *Leaf-blades* linear-lanceolate, acuminate, up to 20 cm. long by 4-5 mm. broad, hirsute on both surfaces with long tubercle-based hairs, midrib distinct above, nerves numerous, margins thickened and scabrid; sheaths rather lax, striate, smooth and glabrous below, hirsute above; ligules membranous, truncate, glabrous.

Inflorescence of spike-like racemes, 2- rarely 3- nate, pressed closely together, 3.5-5 cm. long, hairy; joints and pedicels $\frac{2}{3}$ ds the length of the sessile spikelet, with whitish-grey, rigid hairs on the outer angles, the interior angles with spreading, soft, short hairs. *Sessile spikelets* with a callus 1.5 mm. long, densely bearded with long hairs. *Spikelets* 6-7 mm. long, variegated green and purple. *Lower glume* chartaceous, nerved in the lower part, not winged, with margins broadly inflexed below, slightly above, hairy on upper part, 7-11-nerved. *Upper glume*; apex recurved and shortly aristulate, 3-nerved,

glabrous, scabrid on the keel and back; lower floret male or empty; lemma lanceolate 4 mm. long, broadly inflexed from the nerved keels, ciliate on the margins; palea as long as the lemma but broader, linear-oblong, hyaline, 2-nerved; upper floret hermaphrodite; lemma 4 mm. long, bifid for half its length; lobes lanceolate, ciliate on the margins; awn very short, inserted in the sinus; anthers 3 mm. long; stamens 3. *Pedicelled spikelets*, lanceolate, violetish; callus 1 mm. long, and long bearded. *Lower glume* narrowly lanceolate, setaceous-acuminate, not winged, long hairy in the upper half; upper glume ovate-lanceolate, setaceous-acuminate, 5-nerved, keel sub-glabrous, long ciliate.

Common about Mawphlang in marshy ground; roots many, fibrous.

6. *Ischæmum timorense* Kunth, Revis. Gram. (1829) 369, t. 98.

Slender herbs. *Culms* rooting at the base, almost compressed, slender, simple or branched, more or less bare at the summit, nodes glabrous or shortly pubescent. *Leaf-blades* lanceolate or linear-lanceolate 3-10 cm. long by 3-7 mm. wide, smooth or scaberulous, margins scabrid; petiole slender 5 mm. long, base attenuate, rounded; shortly acuminate, soft, glabrous or with appressed hairs; sheaths compressed, lax, throat not auricled, very glabrous or pubescent towards the throat; ligules very short, membranous, rounded, truncate.

Inflorescence of 2 spiciform racemes, greenish or brownish, 2.5-7 cm. long, with sparse hairs, one sessile or shortly pedicelled, the other with a pedicel 3-6 mm. long; joints 2.5-3 mm. long, outer angle with rigid hairs, almost erect, .8-1.5 mm. long, interior angle shortly ciliate; joints and pedicels excavated towards the inner angle. *Sessile spikelets* ovate-lanceolate, 2.5-4 mm. long; callus linear oblong, .5 mm. long, long-bearded; lower glume 2.5-4 mm. long, ovate or ovate-lanceolate, acuminate and almost depressed at the summit, bicuspidate, margins involute near the base, broadly rounded, auriculate at the base, smooth, strongly 5-9-nerved, scabrid, a little coriaceous and polished at the base, thinner above, convex on the back; upper glume 4 mm. long, membranous at the top, lanceolate, acuminate or aristate, rounded

on the back, recurved, obscurely 2-toothed, keel obscure in the lower half, back glabrous or ciliate, margins hyaline, inflexed and ciliate, 3-5-nerved. *Lower floret* empty or male; lemma 2·5-3·5 mm. lanceolate-acute, margins hyaline, membranous, 1-nerved; palea 2·5 mm. long, sub-membranous, linear-oblong, 2-nerved, margins infolded, broadly hyaline. *Upper floret* hermaphrodite; lemma 3 mm. long, ovate-oblong, hyaline, 2-lobed; lobes lanceolate acute or acuminate; margins ciliate; awn slender 6-9 mm. long, column brownish, hardly exerted. *Pedicelled spikelets* small, elliptic-lanceolate, awned.

Common throughout the province.

33. SEHIMA Forsk.

Spikelets 2-nate, those of each pair differing in sex, one sessile, the other pedicelled on the articulate, fragile rhachis of solitary spike-like racemes, the pedicelled tardily separating from their pedicels, the sessile deciduous together with the adjacent joint of the rhachis and the pedicel. *Florets* 2; lower male, upper hermaphrodite in the sessile, male or neuter in the pedicelled spikelets. *Sessile spikelets*; glumes equal or sub-equal; lower glume flat, 2-dentate, or 2-mucronate, more or less chartaceous, upwards acute, 2-keeled, with inflexed margins; upper glume boat-shaped, keeled upwards, with a bristle-like awn. *Lemmas* hyaline; of lower floret entire, muticous; of upper 2-fid and awned from the sinus. *Paleas* more or less equalling their lemmas, hyaline. *Lodicules* 2, cuneate. *Stamens* 3. *Stigmas* linear-oblong, laterally exerted. *Caryopsis* oblong, obtusely trigonous; embryo reaching to the middle of the grain. *Pedicelled spikelets* flat, with 2-florets resembling the lower floret of the sessile spikelet, the lower or both more or less reduced and barren.

Perennial or annual grasses; blades convolute when young, at length flat, narrow; ligule a line of stiff hairs; racemes usually gently curved, dorsi-ventral and laterally compressed, with the pedicelled spikelets converging over the convex side; joints and pedicels sub-linear and parallel.

Sehima nervosum Stapf in Flor. Trop. Afr. IX (1917)
36. Syn. *Ischæmum laxum* R. Br., Prodr. (1810) 205.

A densely tufted perennial grass. *Culms* slender, terete, glabrous, smooth or slightly rough below the inflorescence, up to 1 m. tall. *Leaf-blades* linear, tapering to a filiform tip, up to 40 cm. long, 3-8 mm. broad, rigid, scabrous, glabrous; sheaths glabrous or hairy, striate; ligule a rim of short stiff or silky hairs.

Inflorescence a solitary raceme, up to 10 cm. long, erect, somewhat nodding; pedicels and joints rather compressed, 2-angled, densely ciliate along the angles, 4-5 mm. long. *Sessile spikelets* 6-8 mm. long, linear to linear-lanceolate, acuminate, pale green in colour, callus shortly bearded. *Lower glume* 6-7 mm. long, chartaceous in texture, 2-toothed, sometimes mucronate, deeply grooved on the back below the middle, 2-keeled, winged on one keel, 6-nerved, with nerves anastomosing. *Upper glume* sub-chartaceous, boat-shaped, keeled above and narrowly winged, aristate, 5.5-6.5 mm. long; arista up to 1.5 cm. long. *Lower floret* male; lemma 6 mm. long, lanceolate, hyaline, ciliate; palea linear, obtuse; stamens 3. *Upper floret* hermaphrodite; lemma hyaline, deeply cleft at the apex into two lobes; an awn, 2.5 cm. long, issues from the cleft; anthers up to 4 mm. long, sometimes absent. *Pedicelled spikelets* as long as the sessile, lanceolate-acuminate, often purple in colour, glabrous. *Lower glume* lanceolate, strongly 7-nerved, of which the inner three are very prominent and scabrid; upper glume sub-chartaceous, lanceolate, finely and long acuminate, 3-nerved, margins ciliate; lower floret male or empty; lemma lanceolate, hyaline, nerveless, paleate; upper floret male or empty; lemma similar to the lower, not awned.

Not collected in ASSAM but likely to occur.

34. APLUDA Linn.

Spikelets in threes at the tips of the branches and branchlets of a leafy panicle, each three supported and embraced by a boat-shaped spathe, borne on a minute peduncle, and deciduous from it as a whole together with the bulbous basal joint of the raceme, or the pedicelled spikelet disarticulating separ-

ately if fertile. *Terminal spikelet* small, barren or almost suppressed, on a flat strap-shaped, broad, glume-like pedicel. *Sessile* and *lateral pedicelled spikelets* similar in shape, both muticous or the sessile, awned, alike in sex, or more often the pedicelled purely male. *Florets* 2; lower male, upper hermaphrodite or usually male in the lateral pedicelled spikelets. *Glumes* equal, herbaceous-chartaceous, or sub-coriaceous towards the base; lower convolute with the margins not or very narrowly inflexed, upper keeled. *Lemmas* hyaline, of the lower floret muticous, of the upper deeply 2-fid and awned from the sinus or nearly or quite entire and muticous. *Palea* hyaline. *Lodicules* 2-cuneate. *Stamens* 3. *Stigmas* laterally exerted. *Caryopsis* oblong, slightly laterally compressed; scutellum reaching to beyond the middle.

Perennial or annual grasses; blades flat; ligules membranous. *Panicle* compound, leafy, the ultimate branches which bear the spikelets clustered.

Key to the species of *Apluda*.

Sessile spikelets awned.	..	..	1. <i>A. aristata</i> .
Sessile spikelets awnless	..	..	2. <i>A. mutica</i> .

1. *Apluda aristata* Linn., Cent. ii. 7. Syn. *A. varia* Hack. sub-sp. *aristata* Hack., Mon. Androp. 196.

A leafy, perennial grass. *Culms* up to 2.5 m. tall, solid, cylindrical, smooth and glabrous, geniculately ascending from a decumbent base or erect; roots wiry; branches flexuous. *Leaves* 10-35 cm. long, sub-bifarious, linear-lanceolate, cuspidately acuminate, base narrowed or usually petioled, upper surface and margins scaberulous, glaucous beneath; upper leaves small; sheaths glabrous, rarely hairy, upper shorter and dilated into spathes with subulate, imperfect blades; ligule membranous, short, rounded.

Inflorescence a leafy panicle made up of very many solitary, simple racemes or false spikes, terminating the stem and its branches, each enclosed in the membranous, peduncled spathe. *Spikelets* in threes; one sessile, two pedicelled; one of the pedicelled is seated upon a broad, strap-like, glabrous pedicel, the other is represented by the pedicel with or without the rudiments of a glume upon it. *Sessile spikelets* herma-

phrodite seated upon the bulbous base of the rhachis; lower glume 4.5 mm. long, chartaceous, many-nerved, somewhat convolute, margins not inflexed; tip obtuse; upper glume boat-shaped, often 2-mucronate, compressed, 4.5 mm. long, keeled, keel glabrous, dorsally gibbous, depressed above, 5-7-nerved. *Lower floret* male; lemma ovate-lanceolate, hyaline, 4 mm. long; palea oblong-lanceolate, hyaline; stamens 3. *Upper floret* hermaphrodite; lemma ovate, 3.5 mm. long, hyaline, cleft half way down, lobes ovate-acute, awned in the cleft; awn 9 mm. long, twisted; palea hyaline, ovate-obtuse. Terminal pedicelled spikelet male; lower glume 4.75 mm. long, lanceolate, many-nerved, compressed at the apex, rounded on the back; upper glume similar. *Lower floret* male; lemma 4 mm. long, ovate-lanceolate, hyaline, scaberulous above, shortly ciliate on the margins; palea lanceolate, hyaline, margins inflexed. *Upper floret* male; 4 mm. long, ovate-acute, hyaline; palea hyaline, oblong-obtuse, 2 mm. long. *Stamens* 3. *Anthers* 2.75 mm. long.

Common in plains and hills up to 5,000 ft.

2. *Apluda mutica* Linn., Sp. Pl. (1753) 82. Syn. A. varia, Hack. sub-sp. mutica Hack., Mon. Androp. 196.

Differs from *A. aristata* Linn. in that the upper lemma of the sessile spikelet is awnless and the upper glume glabrous and acute.

KHASI and JAINTIA HILLS, 5,000 ft.

35. VOSSIA Wall. et Griff.

Spikelets 2-nate, those of each pair alike in shape and sex (or the pedicelled male), on the moderately fragile, articulate rhachis of digitate, rarely solitary, spike-like racemes, sessile separating only very tardily together with the contiguous joint of the rhachis and the pedicel; joint and pedicel slightly gaping. *Florets* 2; lower male, upper hermaphrodite, or sometimes male in the pedicelled spikelets. *Glumes* unequal; lower coriaceous, flat on the back, produced into a long tail like acumen, 2-keeled, narrowly inflexed along the margins; upper boat-shaped, chartaceous, keeled. *Lemmas* hyaline, of lower floret 2-nerved, of upper faintly 3-nerved,

paleas 2-nerved. *Lodicules* 2, large, broadly cuneate. *Stamens* 3. *Stigmas* linear, laterally exerted. *Grain* unknown.

Perennial from a rooting base, often floating; blades long and flat; ligules membranous ciliate; racemes sub-terete or more or less compressed; joints compressed below, widened above; pedicels similar but narrower and flatter.

Vossia cuspidata Griff., Notul. III; index p. 12; Ic. Pl. Asiat. t. 133. Syn. V. procera Wall. & Griff. in Journ. Asiat. Soc. Beng. V. (1836) 573.

Perennial. *Culms* submerged or floating, copiously rooting from the submerged nodes, as thick as the finger below, very many-noded, terete, perfectly smooth and glabrous, branching below, the aerial part up to over 1 m. high. *Leaf-blades* linear, long-tapering to a fine point, up to 1 m. long by 2.2.5 cm. wide, convolute in vernation, then flat, rather rigid, rough on both sides, glaucous, glabrous, midrib very stout below, lateral nerves numerous; leaf-sheaths glabrous and smooth or more or less scaberulous with small tubercle-based hairs, tight or the lower somewhat loose, mostly exceeding the internodes; ligules very short, truncate.

Racemes pale green or straw-coloured, solitary or 2-6 on a short common axis, opposite, 15-22.5 cm. long, erect, rigid or slightly nodding, stout; joints about 8 mm. long, more or less convex or almost flat on the back, scabrid along the angles, disarticulating horizontally; pedicels as long as the joints or slightly longer, scabrid along the angles. *Sessile spikelets* with a narrow contracted callus, ovate, oblong, without the tail, 8 to over 10 mm. long. *Lower glume* ovate-oblong, with a straight subulate tail, up to 2 mm. long and 2 mm. wide at the base, smooth and shining on the back, spinulosely scabrid along the keels and the edges of the tail, many nerved if observed in transmitted light. *Upper glume* about 8 mm. long, ovate-oblong in outline, mucronulate, spinulosely scabrid on the keel, otherwise glabrous, 5-9-nerved, the pair of lateral nerves sub-marginal, the inner or also the outer anastomosing with the middle nerve above. *Lower floret*; lemma 8 mm. long, oblong-lanceolate, minutely 2-dentate, 2-keeled, glabrous except the ciliolate tips, with a linear-oblong, 2-nerved palea.

Upper floret hermaphrodite, similar to the lower, except that the lemma is acute and 3-nerved. *Anthers* 4 mm. long. *Stigmas* over 2 mm. long. *Pedicelled spikelets* similar to the sessile, usually slightly smaller.

DARRANG, SYLHET, GOALPARA, in depressions flooded in the rains.

36. THYRSIA Stapf.

Spikelets 2-nate, those of each pair very similar in shape, or the pedicelled more or less reduced or quite rudimentary, different in sex (occasionally some homogamous in the same inflorescence) on the fragile, articulate rhachis of racemosely arranged or paniced spike-like racemes; joints and pedicels stout, posticously contiguous or almost so; articulation at right angles to the rhachis; tips hollowed out, not appendaged. *Sessile spikelets*; florets 2, lower reduced to a barren lemma, upper hermaphrodite, awnless. *Glumes* equal, coriaceous or more or less chartaceous or the upper membranous; lower flat on the back, smooth, 2-keeled, narrowly inflexed along the margins, muticous; upper boat-shaped, keeled. *Lemmas* hyaline, awnless, of lower floret 2, of upper 3-nerved. *Palea* of upper floret hyaline, 2-nerved; lodicules 2, cuneate. *Stamens* 3. *Stigmas* laterally exerted. *Grain* oblong, dorsally compressed; scutellum extending beyond the middle.

Tall coarse grasses; blades very long, hard, flat; ligules very short, membranous; racemes rather stout and stiff, more or less distinctly dorsi-ventral and sometimes sub-moniliform owing to the constriction between the swollen joints and pedicels.

Thyrsia zea (Clarke) Stapf in Hook. Ic. Pl. XXXI, sub. t. 3078. 1922. Syn. *Rottbællia zea* C. B. Clarke in Journ. Linn. Soc. XXV (1889) 86. t. 38.

Culms 2 m. tall, rounded, very glabrous with the flower-bearing branches at the summit. *Leaves* linear, almost as broad as the top of the sheath, flat or rolled, rigid, hairy at the base, scabrid above, smooth below, margins very serrulate; scabrid, ciliate, reaching 1 m. in length by 1-2 cm. broad; median nerve thick, broad and white above; sheaths rather

compressed, keeled above, nodes puberulous; ligules very short, truncate, membranous, hirsute.

Inflorescence a sub-compound panicle, ovate-oblong, 25-40 cm. long, rather dense; common rhachis extended; lower spiciform racemes often sub-verticillate in fours, the upper arranged in a spiral, all spreading-erect, compressed; peduncles 2.5 cm. long, the lower with often 2-5-divisions, the upper (rarely all) simple; the lower spiciform raceme longer than the upper, slender, glabrous; rhachis 1 mm. thick; joints 4 mm. long, linear or claviform, incurved, sub-compressed, angular on the back, glabrous on with the back, scabrid; articulation straight, disarticulating and leaving a semi-orbicular scar, slightly concave. *Sessile spikelets* 4 mm. long, sub-oblique, ovate, glabrous, exceeding in all places the cavity in the rhachis, muticous, dorsally compressed; callus very narrow, in the form of a ring separated from the glume by a deep transverse channel, obscurely coloured, glabrous. *Lower glume* 4 mm. long, papyraceous-membranous, keels coriaceous, obtuse, entire, margins narrowly inflexed, folds narrowly scarious, keeled, serrulate, very scabrid, back almost depressed, punctate, scaberulous, 1-3-nerved; lateral nerves short. *Upper glume* 4 mm. long, membranous or coriaceous, ovate-acute, 3-nerved, keel smooth. *Lower floret*; lemma 4 mm. long, hyaline, lanceolate-acute, 2-nerved, empty. *Upper floret* hermaphrodite; lemma 3.5 mm. long, hyaline, ovate oblong, sub-acute, glabrous, very delicately 2-nerved; palea 1.75 mm. long, hyaline, ovate-oblong, sub-acute, delicately 2-nerved; anthers 2.5 mm. long, filaments short; stigmas short linear, equalling the styles. *Pedicelled spikelets* 3.4-3.8 mm. long, oblong, almost similar to the sessile in other characters; pedicels 1.2-2 mm. long, free, laxly appressed, a little compressed.

Common in the hills in grassland, 3-4,000 ft.

37. HEMARTHRIA R. Br.

Inflorescence of false spikes, compressed, often curved, more or less subulate at the top, tough or at last caducous, enclosed in a spathe; joint and pedicels fused into internodes which are hollowed out to take the sessile spikelet. *Rhachis* tardily disarticulating, articulations straight or almost so,

joints truncate at the top, not hollowed, without an appendage; spikelets 2-nate, similar in sex and shape or almost so, opposite at the fusion of the joints and pedicels, each pair formed of a sessile and a pedicelled spikelet, which is the pedicelled spikelet corresponding to the sessile spikelet of the pair below. *Sessile spikelets* 2-flowered; glumes equal or almost so, the lower with a flat back, 2-keeled, narrowly inflexed on the margins, coriaceous or sub-coriaceous, filling the cavity formed by the adjacent joint and pedicel; upper membranous, adhering to the inner surface of the cavity. *Lower floret*; lemma 1-2-nerved. *Upper floret* hermaphrodite; lemma nerveless; palea small, hyaline, nerveless; lodicules 2, cuneiform. *Stamens* 3; stigmas exerted laterally. *Caryopsis* oblong, somewhat flattened on the back, hilum punctate, almost basal. *Pedicelled spikelets* with glumes more or less long acuminate (above all those of the terminal spikelets); upper glume mucronate or aristate.

Perennial herbs, decumbent or ascending. *Leaves* linear.

Key to the species of *Hemarthria*.

Spikelets less than 6 mm. long :—

- | | | |
|--|---------|---------------------------|
| Weak, rarely erect; spikelets 4.4-5 mm. long;
upper glume of pedicelled spikelets acuminate,
7-9-nerved; lower glume obtuse, two-toothed;
tip often oblique, often contracted below the apex. | | 1. <i>H. compressa</i> . |
| Stout, erect; spikelets 4.5-5 mm. long;
upper glume of pedicelled spikelets awned,
1-3-nerved; lower glume of sessile spikelet
acute, not contracted below apex. | | 2. <i>H. protensa</i> . |
| Spikelets over 8 mm. long. | .. .. . | 3. <i>H. longiflora</i> . |

1. *Hemarthria compressa* R. Br., Prod. (1810) 207.
Syn. *Rotthœllia compressa* Linn. f., Suppl. 114.

Perennial. *Culms* compressed, erect or decumbent, often branchy, sometimes with pubescent nodes; flower-bearing branches solitary or ternate, short, simple or very rarely somewhat branched, surrounded by sheaths. Adult leaves flat or almost so, smooth or scabrid above and on the margins, rarely on the slender median nerve below; sheaths not auriculate or hairy in the throat, compressed and keeled, somewhat loose,

much shorter than the internodes; ligules very short, truncate, membranous, ciliate.

Inflorescence of racemes or false spikes, 6-10 cm. long, compressed, erect, the upper often fascicled, sometimes somewhat incurved, exerted slightly from the sheath, herbaceous, dark green; joints of the rhachis glabrous, thickened by the fusing of the pedicel, much shorter than the spikelets, with the back slightly, and the front deeply, excavated, scar and articulation flat. *Sessile spikelets* 4-4.5 mm. long, linear-lanceolate; callus small, distinct, smooth, glabrous; lower glume with a flat back, margins somewhat reflexed, linear-oblong or oblong, obtuse, emarginate, or 2-toothed, often sub-oblique and narrowly winged, marginal fold smooth to the tip, 7-9-nerved in the narrow grooves; upper glume as long as the lower, concave, sub-keeled, very thin, membranous, closely applied and often adnate to the excavation in the rhachis, elliptic-lanceolate or ovate, acuminate, muticous, or very shortly subulate, aristate, 3-5-nerved. *Lower floret*; lemma oblong, obtuse, hyaline, 2-nerved. *Upper floret* hermaphrodite; lemma shorter than that of the lower floret, ovate-oblong, almost nerveless; palea much shorter, linear-obtuse, nerveless, rarely absent. *Anthers* 2.5 mm. long. *Pedicelled spikelets* male, or if hermaphrodite, with rudimentary anthers, scarcely longer than the sessile or equal to them in length, but narrower, linear-lanceolate or subulate, scabrid at the top; pedicel fused to the rhachis; lower glume herbaceous, sub-coriaceous, subulate or narrowly lanceolate, 7-nerved; upper glume free, a little longer than the lower; hyaline but somewhat firm, acuminate or shortly aristate, 7-9-nerved. *Terminal spikelet* with a long pedicel and with glumes longer acuminate than the others.

Found in marshes in plains and hills up to 5,000 ft.

2. Hemarthria protensa Steud., Syn. Pl. Glum. (1854)

359. Syn. *Rottbœllia protensa* Hack., Mon. Androp. 289.

Perennial. *Culms* 9-1.8 m. tall, erect from a decumbent base, branchy, fastigiate at the summit. *Leaves* linear-lanceolate, contracted in the lower third, acuminate, 6-50 cm. long, 4-6 mm. wide, the adult leaves flat or caniculate, very glab-

rous on both faces and with smooth margins; sheaths somewhat loose, glabrous or with scattered hairs, much shorter than the internodes, those with branches and the terminal much shorter and spathiform; ligules very short, truncate, ciliate.

False spikes slender, straight or somewhat curved, compressed, 10-20 cm. long, hardly exerted from the sheath; rhachis tough with glabrous joints, more slender than those of *H. compressa*, 4.5-5.2 mm. long, with a flat scar; pedicels often straight, adnate to the joints, rarely quite free. *Sessile spikelets* linear-lanceolate, 6-7 mm. long, glabrous, slightly depressed at the base, with an indistinct callus; lower glume 6-7 mm. long, coriaceous, acute, not constricted below the apex, margins inflexed, back flat, 13- to many-nerved, nerves distinct; upper glume 6-7 mm. long, more or less adnate to the rhachis, membranous, elliptic-lanceolate, acute, often aristate, slightly keeled. *Lower floret*; lemma 4.5-7 mm. long, broadly oblong, obtuse, empty. *Upper floret* hermaphrodite; lemma absent or 1.5-1.7 mm. long, hyaline, ovate-oblong; palea shorter, linear-obtuse. *Stigmas* extended, exerted near the base of the spikelet. *Pedicelled spikelets* 6-7 mm. long, almost the same as the sessile; lower glume 6-7 mm. long, acuminate, especially so in the terminal spikelet, aristate, 7-nerved at the top; awn slender, very narrowly marginate. *Upper glume* 6-7 mm. long, free, coriaceous-chartaceous, subulate, ending in an awn often longer than itself, compressed, scabrid, keel very excentric, raised towards the margins, 1-3-nerved. *Terminal spikelet* with a longer pedicel, and more acute glumes.

Very common in marshes in plains and hills up to 4,000 ft.

3. Hemarthria longiflora (Hook. f.) A. Camus in Lecomte, Flor. Gen. de l'Indo-Chine, VII. 379. Syn. Rottbœllia longiflora Hook. f., in F.B.I. VII. 154.

Culms 30-60 cm. tall, erect from a decumbent base, smooth, glabrous, spongy below, nodes glabrous or pubescent. *Leaf-blades* linear-lanceolate from a rounded base, 7-15 cm. long by 6-8 mm. wide, smooth and glabrous even on the margins, flaccid; sheaths rather lax, compressed, sub-keeled, glabrous

or with a few scattered hairs; ligules very short truncate, ciliate.

Racemes 10-15 cm. long, stout, about 6 mm. across, compressed, sheathed below; rhachis sub-tetragonous, tough; joints half the length of the spikelets, smooth and glabrous. *Sessile spikelets* 8-12.5 mm. long, exceeding by far the excavation in the rhachis, lanceolate, acuminate, awned; callus short; lower glume 8-12.5 mm. long, coriaceous, lanceolate, extending into a scabrid awn or at least acuminate; back flat and strongly 13-15-nerved; margins inflexed and winged towards the top; upper glume 10 mm. long, often somewhat adnate to the rhachis, chartaceous-coriaceous, ovate-lanceolate, long acuminate, abruptly contracted into an awn shorter than that of the lower glume. *Lower floret*; lemma 5 mm. long, hyaline, ovate-oblong, lanceolate; palea absent. *Upper floret* hermaphrodite; lemma 4 mm. long, hyaline, linear-oblong, obtuse; palea very short; anthers 1.75 mm. long; ovary broadly obovate, 2 mm. long. *Pedicelled spikelets* acuminate, 10 mm. long, of which about half is a scaberulous arista, very thick coriaceous, somewhat oblique, upper glume similar in shape and size but more delicate in texture; lower floret; lemma oblong-obtuse; 4.5 mm. long, hyaline, 2-nerved; upper floret hermaphrodite; lemma 4 mm. long, hyaline, similar in shape and texture to the lower; palea linear, 2 mm. long.

Not common, but does occur in Sylhet and probably elsewhere.

38. MNESITHEA Kunth.

False spikes solitary at the apex of the culm and of its branches, cylindrical; rhachis very fragile, joints fused to, or embracing the pedicel; articulation straight or slightly oblique, very concave; two excavations at each joint in which are lodged the spikelets. *Spikelets* 3, situated at each node of the rhachis, at least towards the base, one pedicelled, aborted or very rudimentary often only a scale, seated between two others which are sessile; pedicel tightly appressed to the rhachis or fused with it; the sessile spikelets are 1-flowered and fit exactly into the excavation in the rhachis. *Sessile spikelets*; lower glume coriaceous or cartilaginous, not keeled. *Lower floret* male or neuter; lemma hyaline, lanceolate; palea like

the lemma but shorter. *Upper floret* hermaphrodite; lemma hyaline, nerveless or almost so; palea similar to the lemma or rather shorter; lodicules absent. *Stamens* 3. *Caryopsis* ovate-oblong, convex.

Perennial herbs. *Culms* erect. *Leaves* linear, narrow, rather stiff.

Mnesithea lævis (Retz.) Kunth, Revis. Gram. 1. (1830)
154. Syn. Rottbœllia perforata Roxb., Pl. Corom. II. 43, t. 182.

Culms 5-1 m. tall, erect, solid, rounded, 4-5-noded, rather slender, often branched, with flower bearing branches at the upper nodes which are long and simple, very rarely of two unequal arms. *Leaves* at the base somewhat narrower than the sheath, spreading, flat, linear, the upper acute the lower obtuse, 8-35 cm. long, 3-5 mm. wide, glabrous except at the base, smooth above, scabrid below towards the median nerve and on the margins; sheaths rounded, not auricled, keeled, glabrous; ligule short.

Racemes 10-20 cm. long, hardly exserted from the upper sheaths, pale green or almost purplish. Joints at the base of the false spike, rarely throughout the spike, carrying geminate sessile spikelets with a median pedicelled spikelet. Towards the top of the raceme one sessile and one pedicelled spikelet to each joint, joints half cylindrical, 3-5 mm. long, very glabrous, channelled towards the top, or in all the axillary racemes, which have sessile spikelets, narrower. *Sessile spikelets* in twos, placed in two contiguous excavations, which are longitudinal in the direction of the axis of the culm; the common wall often being perforated; the pedicel of the pedicelled spikelets is placed between these two excavations and is adnate to the joint, and carries the rudimentary spikelet. *Sessile spikelets* obliquely oblong, 3-5-5 mm. long, very glabrous; lower glume very coriaceous, more or less obliquely ovate-oblong, obtuse, back convex, more or less foveolate, obscurely 5-7-nerved; upper glume 3-5-5 mm. long, membranous, sub-keeled, almost without nerves, white, for the rest it resembles the lower glume; lower floret male or neuter; lemma 3-4-5 mm. long, oblong-lanceolate; upper floret hermaphrodite; lemma 2-5-4

mm. long, hyaline, oblong-lanceolate. Anthers 2.5-3 mm. long. *Caryopsis* 2 mm. long. *Pedicelled spikelets* rudimentary, reduced to a glume, .5-1 mm. long, almost round, margins laxly infolded; sometimes a very small second glume present.

Common in the plains.

39. HACKELOCHLOA O. Kuntze.

Spikelets 2-nate, one sessile and the other pedicelled, with the pedicels completely adnate to the joints of the rhachis, on the articulate and fragile rhachis of fascicled spike-like racemes, conspicuously heteromorphous, alike in sex or the pedicelled neuter; the sessile deciduous with its joint and pedicelled spikelet belonging to it. *Sessile spikelet*; florets 2, upper hermaphrodite, lower barren. *Glumes* equal; lower cartilaginous, sub-globose; upper chartaceous, immersed in the cavity of the joint. *Lemmas* hyaline, muticous. *Paleas* hyaline, absent from the lower floret. *Lodicules* broadly cuneate. *Anthers* exerted from the apex of the spikelet. *Stigmas* exerted terminally. *False fruit* nut-like, formed by the hardened lower glume of the sessile spikelet and the closely applied joint. *Caryopsis* sub-orbicular, very convex on the back, almost flat on the face; embryo large. *Pedicelled spikelet*; florets 2; lower barren; upper hermaphrodite, or more or less reduced or suppressed. *Glumes* equal, herbaceous, ovate. *Lemmas*, if present, hyaline, the lower without a palea.

Annual grasses, much branched; leaves soft; racemes very conspicuous on account of the grain-like fertile spikelet.

Hackelochloa granularis O. Kuntze, Rev. Gen. Pl. (1891) 776. Syn. *Manisuris granularis* Linn. f., Nov. Gram. Gen. (1779) 40.

Culms erect, up to over 1 m. high, more or less terete below, compressed above, glabrous or hirsute with tubercle-based hairs. *Leaf-blades* lanceolate or linear-lanceolate, from a cordate or amplexicaul base, acute, 5-10 cm. long, 10-15 mm. wide, more or less hirsute from fine tubercle-based hairs, margins ciliate, midrib white and flat above; sheaths loose to inflated, usually more or less compressed, striate, hirsute with

tubercle-based hairs, usually bearded at the nodes; ligules very short, membranous, ciliate.

False spikes 1·25-2·5 cm. long, about 2 mm. wide, borne on short or long peduncles, partly enclosed in or completely exerted from the supporting spathe-like sheaths, glabrous, pale green; joints linear, 1-1·75 mm. long, the portion corresponding to the pedicel with 2 fine grooves, that corresponding to the rhachis with one broad flat groove, both with distinct scars, that of the joint hollowed out. *Sessile spikelet*, including the short obconical callus, from almost 2·5 mm. to 3 mm. long, glabrous. *Glumes* sub-equal; lower pitted and tubercled, with faint longitudinal often interrupted ribs, nerves numerous, faintly visible from within; upper glume broad ovate-oblong, obtuse, and adhering below to the cavity of the joint, thickened at the tip, hyaline towards the base, 3-nerved. *Lower floret* shorter than the glumes; lemma broadly ovate-obtuse. *Upper floret* 1 mm. long; lemma ovate-obtuse, like the similar palea, nerveless. *Anthers* ·6 mm. long. *Stigmas* up to 1 mm. long. *Caryopsis* less than 1·25 mm. long. *Pedicelled spikelet* as long as the sessile or slightly longer, ovate, herbaceous, green or purplish. *Glumes* equal; lower slightly asymmetrical, one keel widened, scaberulous, nerves 5-7, very marked, green; upper boat-shaped, prominently keeled, keels scaberulous; nerves 5-7. *Lower floret* barren; lemma ovate-lanceolate, acute, hyaline, 2-nerved. *Upper floret*; lemma similar to that of the lower, but shorter and 1-nerved, or like the palea nerveless; frequently the florets reduced or suppressed.

A good fodder to all stages and suitable for hay. Common in plains and hills up to 4,000 ft.

40. ROTTBÆLLIA Linn. f. (in part).

Spikelets 2-nate on the nodes of the very fragile rhachis of stout, cylindric, perfectly glabrous, spike-like racemes which terminate the culms and their branches (in the latter case spathe-supported), different in sex and usually also in size, colour, and nervation, except those of the uppermost pairs which are barren, homœomorphous and upwards

increasingly reduced, forming a tapering tail-like appendage to the raceme; joints dorsally flattened below, widely cup-shaped and hollowed out upwards, more or less completely fused, although externally marked off, with the equally flattened and upwards very slightly thickened pedicels along their posticous angles, forming a deeply concave rather thin walled receptacle for the reception of the sessile spikelet; disarticulation of the joints at a right angle or oblique to the rhachis, of the pedicelled spikelets slightly oblique leaving a crescent-shaped, slightly concave scar. *Sessile spikelet* pale, triangular in cross section, the narrow callus fused with the bases of the adjacent joint and pedicel into a glabrous ring from the centre of which protrudes a knob fitting into the cup-shaped hollow of the next lower joint, the whole plexus falling together. *Florets* 2, upper hermaphrodite, lower male, awnless. *Glumes* equal; lower coriaceous, flat on the back, with very narrow inflexed margins, 2-keeled upwards, obtuse or sub-obtuse; upper boat-shaped, keeled upwards, acute. *Lemmas* hyaline, 3-nerved. *Palea* as long as or almost as long as the lemmas, hyaline, 2-nerved. *Lodicules* 2, cuneate. *Stamens* 3. *Stigmas* suberect or shortly laterally exserted. *Caryopsis* broad-oblong or ellipsoid, dorsally compressed; hilum large suprabasal; embryo almost as long as the grain. *Pedicelled spikelets* similar to the sessile, but more compressed, green, striate, with 2 male florets, or small or more or less reduced.

Annual, usually coarse grasses, often with stiff roots from the lowest nodes, more or less branched, particularly upwards; blades large, linear-lanceolate, rather wide; ligule membranous, short; racemes dorsi-ventral with the spikelets placed anticously and laterally, the barren terminal appendages often very slender and their imperfect spikelets very narrow, green.

Key to the species of *Rottbællia*.

- Lower glume of the pedicelled spikelet oblong
or elliptic; racemes over 5 cm. long. .. 1. *R. exaltata*.
Lower glume of the pedicelled spikelet orbicular;
racemes up to 5 cm. long. .. 2. *R. goalparensis*.

1. **Rottboellia exaltata** Linn. f., Suppl. (1781) 114.

Culms erect up to 3 m. high, branched, branches more or less erect, smooth or rough or even hirsute, terete with a channel facing the branches. *Leaf-blades* linear-lanceolate, tapering to a long fine point, 30-45 cm. long, 1.25-2.5 cm. wide, somewhat flaccid, glaucescent, smooth below, scabrid with minute stiff hairs above, very rough along the margins; sheaths terete, tight or widened upwards, usually hirsute with tubercle-based hairs, sometimes quite glabrous, strongly striate, ciliolate; ligules membranous, brown, stout, rounded, ciliolate.

Racemes 7.5-15 cm. long, stiff, pale yellowish-green, joints 5.7-5 mm. long, rounded on the back, concave on the inner face, smooth, disarticulating with an almost orbicular scar; pedicels slightly shorter than the joints, broad, rounded on the back, concave on the inner face. *Sessile spikelet* 6.25-8 mm. long including the short broad smooth callus, ovate-lanceolate, glabrous. *Glumes* about equal, the lower coriaceous, sub-acute, entire or very minutely 2-toothed, smooth or very slightly rough, intracarinal nerves very faintly visible on the inner surface, about 9, often narrowly winged near the emarginate apex; upper glume boat-shaped, very broad in profile, obliquely acute, about 11-nerved. *Lower floret*; lemma oblong-lanceolate, acute, glabrous, with a palea similar in shape and size, but firmer, rigid, 2-nerved. *Upper floret*; lemma slightly shorter than that of the lower floret, boat-shaped, obliquely ovate in profile; palea narrowly oblong, nerveless, almost as long as the lemma. *Anthers* 2.5-3.75 mm. long. *Styles* almost 2.5 mm. long. *Caryopsis* up to 3.75 mm. by 2.5 mm. pale. *Pedicelled spikelet* about the size of the sessile, but more compressed and (particularly the upper) more or less acuminate, green striate and with 2 male florets, or more or less reduced; the upper consisting of one glume only; lower glume often winged on the keel and the upper on one side, slightly oblique.

Said to be a very valuable fodder for cattle and horses at all stages of its growth. Very common in the plains and in the hills up to 6,000 ft.

2. Rottboellia goalparensis Bor, Ind. For. Rec. (Bot.) I. 3 (1938) 100.

Culms erect, up to 2 m. tall, stilt-rooted below, smooth, terete, much branched, deeply channelled opposite the insertion of a leaf or branch, smooth and glabrous. *Leaf-blades* up to 1 m. or more long, erect, rather stiff, linear but tapering away to a very fine point and also tapering at the base to its junction with the sheath, median nerve very prominent below at the base, disappearing towards the tip, both surfaces hirsute with short white hairs or bristles from very broad tubercle bases, margins spinulose-serrulate; sheaths lax, much shorter than the internodes, markedly striate, hirsute with caducous, upwardly directed spines from broad tubercle-bases, finally glabrous; median nerve of the leaf-blade carried down into the sheath for some distance; nodes glabrous; ligules membranous, up to 6 mm. long or very short, reduced to a mere rim.

Racemes 3.5 cm. long, 3 mm. in diameter, stiff, pale yellowish-green, recurved, seated on very rough, long exerted peduncles, joints 4 mm. long, green, striate, rounded on the back, concave on the inner face, thin, smooth, disarticulating with an almost orbicular scar which is hollowed out to receive an appendage from the base of the joint next above, often fused to the pedicel, disarticulating at right angles. *Sessile spikelet* 5.5-5 mm. long, including the narrow callus, which is separated from the lower glume by a definite furrow, ovate-oblong, obtuse. *Glumes* sub-equal; *lower* 4 mm. by 3.5 mm. obtuse, coriaceous, flat or slightly depressed on the back, margins very narrowly inflexed, 7-9-nerved; *upper glume* boat-shaped or obliquely sentry-box-shaped, chartaceous, closely applied to the cavity formed by the pedicel and the joint. *Lower-floret* male; lemma oblong-obtuse, 3-nerved, hyaline, 3.5 mm. long, margins slightly inflexed; palea rather firm, of the same shape, margins broadly inflexed, striate. *Upper floret* hermaphrodite; lemma broadly oblong, hyaline, obtuse, 1-nerved, 2.5 mm. long; palea hyaline, narrower and shorter. *Stamens* 3, anthers 2 mm. long. *Styles* 2 mm. long; *stigmas* 4 mm. long.

Pedicelled spikelet; pedicels sometimes adnate to the joints, broad, flat. *Spikelet* almost orbicular, broadly elliptic, apex emarginate; lower glume 1.5 mm. coriaceous; upper glume similar in shape, chartaceous; containing one hyaline empty lemma.

KOCHUGAON, GOALPARA.

41. CŒLORHACHIS Brongn.

Spikelets 2-nate on the nodes of the fragile rhachis of slender, more or less compressed, conspicuously dorsi-ventral spike-like racemes which terminate the culms and their usually fascicled spathe-supported branches, different or very rarely alike in sex, similar in shape or the pedicelled more or less to very much reduced; joints and pedicels similar or the latter more slender, linear to cuneate or sub-clavate, dorsally compressed, glabrous, contiguous or nearly so; disarticulation of the joint at right angles to the rhachis, their tips more or less hollowed out, with or without an auriculiform appendage. *Sessile spikelets* dorsally compressed, the narrow transverse callus fused with the bases of the adjacent joint and pedicel into an obscure rim, from the centre of which protrudes a knob fitting into the hollow of the next lower joint, the whole plexus falling together. *Florets* 2; the lower usually reduced to the lemma, rarely with a small palea, always neuter; upper hermaphrodite, awnless. *Glumes* sub-equal; lower flat or slightly convex on the back, smooth or variously sculptured, with narrow inflexed margins, 2-keeled upwards and more or less winged from the keels, obtuse or emarginate, very faintly nerved; upper chartaceous, keeled, acute, 1-3-nerved. *Lemmas*, hyaline, of lower floret 2-nerved or nerveless, of upper 3-1-nerved or nerveless. *Palea* hyaline, similar to the lemma, 2-nerved or nerveless. *Lodicules* 2, cuneate. *Stamens* 3. *Stigmas* laterally shortly exerted. *Grain* oblong, dorsally compressed embryo about half the length of the grain. *Pedicelled spikelet* very varied, similar to the sessile or more or less reduced or rudimentary, male or neuter, very rarely hermaphrodite.

Mostly tall coarse perennial grasses, much branched up-

wards; racemes with the not rarely imbricate sessile spikelets placed anticously and the pedicelled laterally.

Key to the species of *Cœlorhachis*.

- | | | |
|--|----|-------------------------|
| Joints of the racemes over 3 mm. long. | .. | 1. <i>C. striata</i> . |
| Joints of the racemes 2 mm. long. | .. | 2. <i>C. khasiana</i> . |

1. *Cœlorhachis striata* A. Camus in Ann. Soc. Linn. Lyon (1921) 197. Syn. *Rottbœllia striata* Nees ex Steud., Syn. Pl. Glum. I (1854) 361.

Perennial. *Culms* 1 m. tall, rather slender, very glabrous, branches smooth, thickened under the false spikes. *Leaves* green, rather rigid, almost liner-lanceolate with the base narrow and broadly distinct from the sheath, setaceous, acuminate, 6-1·2 m. long. 8-50 mm. wide, the adult leaves flat, margins scabrid; leaf surfaces smooth or glabrous or a few hairs below; sheaths rounded, glabrous or hirsute with fine tubercle-based hairs, the lower exceeding the internodes, the upper shorter, those at the summit of the culms aphyllous, spathiform, outer margins ciliate, often a few hairs about the nodes; ligules glabrous very short, or with a rudimentary limb.

The false-spikes of the inflorescence are fascicled, slender, erect, sub-cylindrical, pale 2·5-5 cm. long, definitely exerted from the sheath; rhachis very fragile, joints 3·7-4·8 mm. long, 1-1·2 mm. in diameter, convex and striate with green on the outside, gradually thickened towards the top, surfaces excised but not excavated. *Sessile spikelet* 4-5 mm. long, glabrous; callus glabrous, very narrow, annular, distinct from the remainder of the glume by a deep groove. *Lower glume*, oblong-obtuse, 4-5 mm. long, coriaceous, with margins smooth and narrowly inflexed, more or less winged below the summit, back convex at the base, with 4-6 striations principally towards the base, often interrupted, the median sometimes hardly marked. *Upper glume* 3·5-4·5 mm. long, chartaceous, ovate-acute, keeled; keel with a sharp angle, smooth. *Lower floret*; lemma 3·5-4·5 mm. long, ovate, acute, hyaline, nerveless; palea 3·3-8 mm. long, hyaline, linear-oblong, obtuse, nerveless. *Upper floret*; lemma

hyaline, ovate, nerveless or obscurely 1-nerved; palea equalling that of the lower floret in shape and size. *Anthers* 2 mm. long, styles equalling the stigmas, linear. *Pedicelled spikelets* small; pedicel equal to the joint in length.

Common in the plains. Often found in *sal* forest in the Haltugan division.

2. Cœlorhachis khasiana Stapf ex Bor, Ind. For. Rec. (Bot.) I. 3. (1938) 101. Syn. *Rottbœllia striata* Nees ex Steud., Syn. Pl. Glum. (1854) 361; sub-sp. *khasiana* Hack., Mon. Androp. 302.

Perennial. *Culms* tall, often solid, much branched, terete, smooth and glabrous, leafy to the top, nodes much shorter upwards, ending at the top in fascicles of peduncles. *Leaf-blades* 60-130 cm. long, up to 4 cm. wide, linear-lanceolate, setaceously acuminate, flat, midrib broad, smooth and glabrous on both surfaces, or with scattered hairs from tubercular bases from both surfaces, sometimes hairy at the base and along the margins; margins cartilaginous, scabrid; sheaths much shorter than the internodes, rather loose, contracted at the mouth, striate, smooth and glabrous; margins membranous; upper sheaths very loose and with a much reduced limb; ligules narrow, 1 mm. long, glabrous, convex upwards, membranous.

Inflorescence of numerous racemes emerging in fascicles from spathe-like leaf sheaths, or solitary from each of the upper nodes of the culms; peduncles often capillary and slightly enlarged below the raceme. *Racemes* 2.5-3 cm. long; rhachis rather less fragile than in *C. striata*; joints and pedicels smooth and glabrous; joints clavate 2 mm. long, pedicels strap-shaped, of the same length. *Callus* smooth and glabrous 1 mm. long, separated from the spikelet by a distinct groove. *Sessile spikelet* 4 mm. long. *Lower glume* 3.5-4 mm. long, coriaceous, winged on both sides just below the apex, margins narrowly inflexed, nervation obscure. *Upper glume* 2.5-3 mm. long, lanceolate, 1-nerved, boat-shaped. *Lower floret* barren; lemma hyaline, lanceolate, 2.5 mm. long. *Upper floret* hermaphrodite; lemma similar to that of the lower floret; palea shorter, hyaline; anthers just

over 1 mm. long. *Pedicelled spikelets* either much reduced 1 mm. long or only a rudiment, or up to 3 mm. long, well developed and fertile; the lower glume is broadly winged, scabrid on the margins, coriaceous on the margins and the rest chartaceous; when present, fertile lemmas and paleas as in the sessile spikelets.

Common in the KHASI and JAINTIA HILLS, 4-5,000 ft.

42. OPHIUROS Gærtn.

Sessile spikelets in the cavities of the rhachis which they fill completely 2- (rarely 1-) flowered, accompanied at each node by a pedicelled spikelet often reduced to the pedicel which is adnate to the rhachis; glumes glabrous; lower thick, coriaceous or cartilaginous, convex, smooth, obtuse, entire, with margins narrowly and slightly inflexed, very obscurely 7-nerved, spreading at anthesis; callus very narrow, annuliform, separated from the rest of the glume by a deep channel; upper glume sub-membranous, concave, obscurely carinate, ovate-oblong, obtuse, 0-3-nerved. *Lower floret* male or neuter; lemma hyaline, elliptic-obtuse, obscurely 2-nerved, margins inflexed; palea narrow or absent. *Upper floret* hermaphrodite; lemma hyaline, oblong-obtuse, nerveless or almost so; palea narrow; lodicules 2, cuneiform, truncate. *Stamens* 3. *Caryopsis* oblong or ovate-oblong, convex on both faces, embryo equalling $\frac{2}{3}$ of the caryopsis.

Culms erect, striate, very glabrous. *Leaves* with sheaths glabrous at the nodes; ligules very short, truncate, glabrous. *False spikes* (sub-compound racemes with adnate pedicels resembling true spikes) solitary or fascicled at the summit of the branches of the stem, cylindrical; rhachis very fragile, intimately fused to the pedicel joints, very thick, semi-cylindrical, glabrous, excavated on one face; articulation straight or somewhat oblique, hollowed, cavity concave.

Ophiuros megaphyllus Stapf ex Haines, Bot. B. & O. (1924) 1058.

Perennial. A stout grass 1.5-2 m. tall, or in exceptional cases up to 4 m. tall; culms terete, smooth and glabrous, branched upwards. *Leaf-blades* narrowly ensiform tapering

from base to apex, up to 1 m. or more long, up to 4 cm. wide below, much narrower upwards, flat, rather rigid, aculeate along the margins, spines arising from tubercle bases, more or less hairy on both surfaces; sheaths much shorter than the internodes, upper spathe-like and without a limb, tight or the upper loose, striate, hirsute with tubercle-based hairs, hirsute on the membranous margins; ligules narrow, convex upwards, membranous.

Racemes 5-15, fascicled in the axils of the spathes or leaf sheaths of the upper nodes, 7-10 cm. long (or perhaps longer) on peduncles slightly swollen at the top below the racemes; peduncles long exserted from the spathes, each solitary on a branch with a villous node, often geniculate at the node. *Rhachis* smooth terete, glabrous, fragile, the joints being at right angles to the axis or slightly oblique and the upper face hollowed to receive a projecting knob from the joint next above. *Pedicelled spikelets* suppressed. *Sessile spikelets* sunk in the rhachis joints and quite flush with them, 3·5-4 mm. long. *Lower glume* 3·5-4 mm. long, coriaceous, 7-9-nerved, or obscurely nerved, back flat to slightly convex, with a few pits or completely smooth. *Upper glume* boat-shaped, hyaline to chartaceous, 3-1-nerved. *Lower floret* empty; lemma ovate-lanceolate to broadly-lanceolate, hyaline; 2-nerved, margins slightly inflexed, palea similar but narrower. *Upper floret* hermaphrodite; lemma and palea similar to those of the lower floret.

Common in plains and hills.

19. MAYDEÆ.

Annual or perennial herbs, often with tall culms; leaf-blades linear to lanceolate. *Spikelets* unisexual, dissimilar awnless, the sexes in different inflorescences or in different parts of the same inflorescence with the male above the female; male spikelets 2-flowered, mostly paired, one sessile, the other or both pedicelled, in solitary or paniced spike-like racemes; glumes membranous to chartaceous, enclosing the florets. *Lemmas* hyaline. *Stamens* 3. *Female spikelets* 2-flowered with the lower floret barren, solitary or sometimes paired, embedded in the hollows of a thickened jointed rhachis or enclosed in a thickened sheath or crowded in rows on a thickened rhachis; glumes hardened or thin; lemmas hyaline.

Key to the genera of *Maydeæ*.

- Racemes of male spikelets numerous arranged in a terminal panicle; caryopses naked at maturity, arranged on a spongy rhachis. 1. *Zea*.
- Racemes of male spikelets solitary at the ends of the branches or accompanying female spikelets :—
 - Caryopsis enclosed in the hardened involucre or glume. 2. *Coix*.
 - Caryopsis enclosed in the hardened lower glume :—
 - Male racemes terminal, the lateral of both sexes. 3. *Polytoca*.
 - All racemes containing male and female spikelets. 4. *Chionachne*.

1. ZEA Linn.

Inflorescence monœcious with the male spikelets in large terminal panicles of racemes or subdigitately arranged racemes; female inflorescence consisting of numerous female spikelets seated upon a spongy axis representing the fused axes of several spikes. *Male spikelets* 2-nate, one sessile, the other pedicelled, on the inarticulate rhachis, 2-flowered.

Glumes sub-equal, membranous, convex, obscurely 2-keeled; lemmas and palea alike; lodicules 2, fleshy; stamens 3. *Female spikelets* 2-nate in 4-11 longitudinal rows, slightly immersed in the axis, with a lower barren and an upper fertile floret, awnless. *Glumes* similar, very broad, fleshy below, hyaline above, nerveless, ciliate. *Lower floret* barren; lemma resembling the glume, paleate or not. *Upper floret* female; lemma similar to the lower, paleate; lodicules 0. *Grain* subglobose or dorsally flattened.

Tall, stout, annual grasses with large leaves.

***Zea mays* Linn., Sp. Pl. (1753) 971.**

An annual, robust, monœcious grass. *Culms* tall, smooth, rooting from the lower nodes. *Leaf-blades* 30-45 cm. long, 2.5-12 cm. broad, broadly lanceolate, flat, hairy above, ciliate on the margins; sheaths smooth, villous towards the margins; ligule short, ciliate.

Male inflorescence a panicle of racemes. *Spikelets* in pairs, one sessile, one pedicelled, with the pedicel shorter than the sessile spikelet, ovate-oblong, acute, 2-flowered. *Glumes* oblong, or ovate-lanceolate, sub-equal, membranous, acute, pubescent, strongly nerved. *Lower floret* male or barren; lemma a little shorter than the glumes, hyaline, ovate-oblong or lanceolate, truncate, ciliolate, 5-nerved; palea a little longer, 2-nerved. *Upper floret* male; lemma as long as the lower lemma, hyaline, oblong, 2-nerved; palea as long as the lower palea. *Stamens* 3; anthers linear. *Female inflorescence*; axillary, sessile, enclosed in the sheath of the leaf and surrounded by bracts. *Spikelets* sessile, half-sunk in the spongy axis, conical in shape, arranged in longitudinal rows, 2-nate. *Lower glume* emarginate, sub-bilobed, ciliate at the top; *upper glume* acute or 2-lobed, ciliate. *Lower floret* empty; lemma membranous, transversely oblong; palea shorter or absent. *Upper floret* female; lemma membranous, transversely oblong, narrowly enveloping the ovary; palea longer. *Lodicules* 0. *Caryopses* crowded, shining, hard, surrounded by the bases of the glumes.

Extensively cultivated in hills and plains.

2. COIX Linn.

Spikelets unisexual; male spikelets 2-flowered, in twos or threes on a continuous rhachis, the normal group consisting of a pair of sessile spikelets with a single pedicellate spikelet between, the latter sometimes reduced to a pedicel or wanting; glumes membranous, obscurely nerved; lemma and palea hyaline; stamens 3; female spikelets 3 together, one fertile and two sterile at the base of the inflorescence, glumes of fertile spikelets several-nerved, hyaline below, chartaceous in the upper narrow pointed part, the first very broad enclosing the spikelet, the margins infolded beyond the two lateral, stronger pair of nerves; second glume narrower than the first, keeled; sterile lemma similar but a little narrower; fertile lemma and palea hyaline; sterile spikelets consisting of a single narrow tubular glume as long as the fertile spikelet, somewhat chartaceous. *Lodicules* 0. *Ovary* ovoid. *Styles* 2, free, slender.

Tall branched grasses with broad flat blades, the monœcious inflorescences numerous on long stout peduncles, these clustered in the axils of the leaves; each inflorescence consisting of an ovoid bead-like, very hard, tardily deciduous involucre, containing the pistillate lower portion of the inflorescence, the points of the pistillate spikelets and the slender axis of the staminate portion protruding through the orifice at the apex. The staminate portion is early deciduous and consists of several clusters of staminate spikelets.

Key to the species and varieties of *Coix*.

Lower glume of the male spikelets narrowly winged :—

Involucres globose :—

Texture of the involucre stony. .. 1. *C. lacryma-jobi*.
Texture crustaceous or chartaceous. .. var. *mayuen*.

Involucres cylindrical. var. *stenocarpa*.

Lower glume of the male spikelets broadly winged.

2. *C. gigantea*.

1. *Coix lacryma-jobi* Linn., Sp. Pl. (1753) 972.

An annual grass. *Culms* branching, rooting at the lower nodes, robust, spongy, glabrous, polished, .9 to 2 m.

tall. *Leaves* flat, firm, long, cordate at the base, acuminate at the tip, 10-50 cm. long, 2-5 cm. broad; median nerve robust, with very slender secondary nerves; sheaths smooth, long, often very broad; ligules 1 mm. long, frilled, membranous, glabrous.

The inflorescence consists of peduncled, sub-erect, false spikes; peduncle 4-8 cm. *Male spikelets* 2-3-nate, loosely imbricate on a slender rhachis, 8-12 mm. long, up to 2 mm. broad; lower glume papyraceous, ovate, many-nerved, shortly winged along the inturned margins, shortly and densely ciliolate; upper glume thin, oblong-lanceolate, acuminate, 9-nerved. *Lower floret* male, triandrous; lemma membranous, hyaline, oblong-lanceolate, acuminate, feebly 5-nerved; palea hyaline, somewhat 2-keeled. *Upper floret* male (triandrous) or empty; lemma 6-10 mm. oblong-lanceolate, acute, 5-nerved. *Female spikelet* ovoid, entirely surrounded by the hardened bract, forming a bony involucre, yellowish-white or bluish-grey, 6-11 mm. long; lower glume ovate-oblong, acute, papyraceous; upper glume thinner, ovate, attenuate at the top. *Lower floret* female or empty. *Upper floret* female with the lemma as long as the spikelet, ovate-oblong; palea a little shorter. *Caryopsis* ovoid or globose.

Cultivated in all hill districts. Also found wild in marshy places.

var. **stenocarpa** Stapf ex Hook. f. F.B.I. VII (1897) 100.

Involucres 12·5—22·5 mm. long by 3 mm. broad, white; much used for decoration by the Angami Nagas. Common in the Naga Hills.

var. **mayuen** Stapf ex Hook. f. loc. cit.

An annual; fruit crustaceous or chartaceous. Quoted in Kew Bull. (1893) 76. as a synonym for *Coix gigantea*. Found in the Khasi Hills at Nartiang 4,000 ft., and elsewhere.

2. *Coix gigantea* Roxb., Flor. Ind. III (1832) 569.

A tall, erect, perennial grass up to 3 m. tall. *Culms* up to 2 cm. in diameter at the base, terete, smooth and polished. Lower leaf-blades 60-120 cm. long, 2·5 cm. broad, base obtuse or subcordate, very scabrid on the margins, upper leaves erect, narrow lanceolate, 20 cm. long by 2 cm. broad, or longer and narrower, sometimes scabrid above.

The inflorescence consists of sub-erect, ultimately drooping, false spikes or racemes; peduncle 5-15 cm. long, male

spikelets ternate, the central pedicelled, forming six imbricate rows on the raceme. *Male spikelets*; lower glume elliptic or obovate, broadly winged towards the apex, rounded on the back, many-nerved, 1.25 cm. long; upper glume lanceolate pale. *Lower floret* male; lemma pale, hyaline, with a plicate ridge; palea as large; stamens 3; lodicules 2. *Upper floret* barren; lemma smaller, hyaline; palea large; lodicules 2; ovary rudimentary. Involucre of female with a distinct ligule, often conical in fruit; 2 rudimentary pedicelled spikelets included.

KHASI HILLS in marshy places.

3. POLYTOCA R. Br.

Inflorescence consisting of a number (3 or more, usually 3) of fragile male racemes arranged on a peduncle, and several lateral racemes, entirely female or female at the base and male at the top, surrounded by a spathiform sheath and the sheath of the leaf; rhachis almost continuous, slender, softly pubescent in the male part; thick and pubescent in the female part, with hollowed joints. *Male spikelets* 2-nate, pairs alternate, 2-flowered. *Lower glume* ovate, sometimes mucronate; *upper* a little shorter and less rigid. *Lower and upper florets* male, or the lower sometimes empty; lemmas and paleas membranous, thin, muticous. *Stamens* three. *Female spikelets* in pairs, one sterile stipitate, the other sessile. *Lower glume* broad, cartilaginous, surrounding the spikelet but the margins not approximate; *upper glume* narrower, rather hard, acuminate; lemmas 2, sub-hyaline or membranous: staminodes absent. *Caryopsis* enclosed by the lower glume and the adjacent joint.

Tall, or moderately tall, monœcious grasses with flat, large and broad leaves.

Key to the species of *Polytoca*.

- | | | |
|---|-------|----------------------------|
| Male racemes stiff, slender; pedicelled spikelets often rudimentary and pedicels adnate to the rhachis. | .. .. | 1. <i>P. digitata</i> . |
| Male racemes flexuous; pedicelled spikelets free. | .. .. | 2. <i>P. wallichiana</i> . |

1. **Polytoca digitata** (*Linn. f.*) *Druce* in *Rep. Bot. Exch. Club Brit. Isles. IV* (1917) 641. *Syn. P. bracteata* Br. in *Bennett Pl. Rar. Jav.* (1838) 20, t. 5.

A perennial grass. *Culms* up to 1.5 m. tall, clothed at the base with old sheaths, densely tomentose on the nodes, grooved on one face, glabrous apart from the nodes. *Leaves* flat, linear, acuminate, narrowed at the base, glabrous or hirsute on the surfaces, 45-60 cm. long, by 1.5-2.5 cm. broad; sheaths long, glabrous or hirsute; ligules membranous pubescent.

Inflorescence of terminal, stiff, peduncled male racemes, and of several lateral racemes entirely female, or male above and female below. *Male spikelets* ovate-acute, 6-7 mm. long, glabrous or pubescent, almost all the pedicels rudimentary and fused to the rhachis. *Lower glume* 6-7 mm. long, herbaceous, ovate-obtuse, mucronate, 7-nerved, often pubescent; *upper glume* narrower and a little shorter, papyraceous, ovate-oblong, strongly acuminate, pubescent. *Lower floret* male or barren; lemma 5-6 mm. long, papyraceous, ovate-oblong, acute; palea shorter, thin. *Upper floret* male; lemma 5-6 mm. long, oblong-acute; palea short. *Female spikelets* 2-nate; pedicellate spikelets rudimentary seated on pedicels fused to the rhachis, lanceolate, 12-18 mm. long, at first concealing the fertile sessile spikelets, afterwards spreading; sessile spikelets pale, shining, 6-7 mm. long. *Lower glume* coriaceous, oblong, obtuse, keeled, villous towards the base on the back, shortly ciliate on the margins, enveloping the spikelet; *upper glume* 6-7 mm. long, coriaceous, ovate-acuminate, long-rostrate. *Lower floret* barren; lemma shorter than the glume, sub-coriaceous, ovate-oblong, acuminate; palea 0. *Upper floret* female; lemma ovate-oblong, hyaline, acuminate; palea hyaline, ovate-oblong, acute. *Caryopsis* small, surrounded by the thickened lower glume, pale yellow in colour, polished, oblong, 7-8 mm. long, hairy in the lower half.

Common in both valleys, ascending to 4,000 ft. in the hills. It is said to be a good fodder grass.

2. *Polytoca wallichiana* Benth. in Jour. Linn. Soc. XIX. (1881) 52.

A perennial grass with well-developed stolons. *Culms* smooth and glabrous, leafy. *Leaf-blades* linear, 20-90 cm. long, 2.5-3.5 cm. broad, rough above, rounded at the base; sheaths narrow, hispid with tubercle-based hairs; ligule hardly present. *Inflorescence* a compound panicle made up of racemes of male spikelets closely arranged on a long peduncle, with lateral racemes more or less enclosed in a spathe with 3-7 female spikelets at the base or in the middle of each raceme and often with male spikelets above and below; rhachis softly pubescent between the male spikelets, fragile, thicker and villous in the female portion. *Male spikelets* 2-nate, one pedicelled, articulate on the pedicels, 6 mm. long, with free pedicels, aristate. *Lower glume* ovate, truncate, very smooth, with a few hairs below the summit, 5-11-nerved, toothed or lobed on one side and produced into a caudate arista 15 mm. long; *upper glume* sub-equal to the lower shortly aristate, ovate-lanceolate 3-nerved. *Lower floret* empty or male; lemma ovate-lanceolate, 3-nerved; palea narrower. *Upper floret* male; lemma as long as the lower lemma; palea equal, hyaline; lodicules 2. *Female spikelets* 2-nate, the pedicelled 10-20 mm. long, at first erect, afterwards spreading, ovate-lanceolate, one margin membranous, the other ciliolate, reduced to a many-nerved glume; the sessile fertile, 6-7 mm. long. *Lower glume* 6-8 mm. long, chartaceous in the lower half, membranous above, shortly toothed at the apex, hairy below, rounded and clasping the rhachis and fused to it below; *upper glume* shorter and narrower, oblong, tapering, with a short arista. *Lower floret* female; lemma as long as the upper glume, similar in shape and texture with a narrow palea. *Upper floret* absent.

Reported from Sylhet. Common in Chittagong.

4. CHIONACHNE R. Br.

Racemes entirely male with one or more female spikelets at the base at first enclosed in spathiform bracts; rhachis articulate at the base and above each female spikelet. *Male spikelets* 2-flowered, solitary, or 2-nate and then one pedi-

celled. *Glumes* dissimilar, lower herbaceous, shallowly concave with a narrow membranous wing on each side, upper chartaceous or rarely herbaceous, narrower. *Lemmas* similar, membranous, paleate, both staminate or the upper empty. *Lodicules* 2, cuneate. *Stamens* 3. *Female spikelets* oblong, dorsally compressed, 2-flowered. *Glumes* very dissimilar; lower thickly coriaceous, embracing but not concealing the rhachis between its inflexed margins, enclosing the upper glume and floret; upper membranous or chartaceous. *Lemmas* delicately hyaline; the lower empty paleate or not; the upper narrow, its palea wrapped round the pistil. *Lodicules* 0. *Styles* very long. *Grain* orbicular, compressed, ventrally channelled.

Annual or perennial erect grasses with flat narrow leaves.

Chionachne koenigii (Spreng.) Thw. Enum. Pl. Zeyl. (1864) 369. Syn. C. barbata Br. in Benn., Pl. Rar. Jav. (1838) 18; Polytocha barbata Stapf ex Hook. f. F. B. I. VII (1897) 102.

A robust perennial monœcious grass. *Culms* erect, terete, smooth, hairy on the nodes, up to 1.5 m. tall. *Leaf-blades* flat, linear, tapering to a subulate point, scabrid above, glabrous or hirsute below, 25-60 cm. long, 6-18 mm. broad; margins scabrid; sheaths glabrous or hairy; ligules tomentose.

Inflorescence a panicle made up of racemes of spikelets 2.5-4 cm. long, male or male at the top and a single (or several) female below; rhachis fragile below the female spikelets and between them, slender between the male spikelets, thick between the female, often glabrous; branches often numerous; spathiform sheaths swollen, broad above the base, mucronate above. *Male spikelets* solitary or 2-nate, 6-8.5 mm. long. *Lower glume* 6-8.5 mm. long, herbaceous with a narrow membranous margin, concave, lanceolate-oblong, obtuse, acute or apiculate, strongly many-nerved, glabrous or hairy; upper glume shorter and narrower, papyraceous, dorsally compressed, ovate acuminate, often 7-9-nerved. *Lower floret* male; lemma 5-7 mm. long, membranous,

oblong-acuminate, 3-5-nerved; palea 4-6 mm. long, hyaline. *Upper floret* male or empty; lemma delicately hyaline; palea as long. *Female spikelets* sessile, often solitary at the base of each partial inflorescence, the pedicelled often absent sometimes rudimentary. *Lower glume* 4-6 mm. long, embracing the spikelet and the rhachis, oblong, keeled, very firm, obscurely many-nerved; upper glume as long, membranous, ovate-oblong or oblong, with rounded, ciliate margins. *Lower floret* barren; lemma oblong, 3-5-nerved with a narrow palea. *Upper floret* female; lemma very narrow, truncate, 3-nerved; palea narrow, truncate; lodicules and staminodes absent. *Caryopsis* enveloped in the thickened lower glume, 5-7 mm. long.

Plains of both valleys and up to 3,000 ft. in the KHASI and JAINTIA HILLS. Manipur.

APPENDIX 1.

My friend Mr. Narayanaswami has pointed out to me that he considers that to keep the genus *Erianthus* apart from *Saccharum* on the doubtful distinction of the presence or absence of an awn, is anomalous and that in his opinion all the species now included in *Erianthus* should be transferred to *Saccharum*. I am aware that certain botanists do not recognise *Erianthus* apart from *Saccharum* and I give here Mr. Narayanaswami's list of species including some new combinations which he has made. The question of the validity of *Erianthus* as a genus must await further research.

1. ***Saccharum longifolium*** Munro ex Bth. in Jour. Linn. Soc. XIX: 66 (1861); *Erianthus chrysothrix* Hack. in Oestr. Bot. Zeitschr. XIX : 6 (1891) ; H. f. F. B. I. 7 : 125 (1897).

2. ***Saccharum longisetosum*** (Anderss.) Narayanaswami; *Erianthus longisetosus* Anderss. ex Bth. in l. c. 67; H. f. F. B. I. 7: 124.

3. ***Saccharum elephantinum*** (H. f.) Narayanaswami; *Erianthus elephantinus* H. f. in H.f. F.B.I. 7 : 122.

4. ***Saccharum filifolium*** Steud. Syn. Gram. 409 (1885); *Erianthus filifolius* Nees ex Steud. Syn. Gram. 409; F.B.I. 7 : 123.

5. ***Saccharum fastigiatum*** Steud. l.c.; Haines in Bot. B. & O. V; 1014 (1924); Blatter & McCann in Jour. Bomb. Nat. Hist. Soc. 32; 288 (1928); *Erianthus fastigiatum* Nees ex l. c. 409 (1855).

6. ***Saccharum griffithii*** Munro ex Aitchis. in Jour. Linn. Soc. XIX : 191 (1822) ; Blatter & McCann l. c. 287; *Erianthus griffithii* H.f. l. c. 122.

7. ***Saccharum Hookeri*** (Hack.) Narayanaswami; *Erianthus Hookeri* Hack. Monogr. Androp. 142; H.f. F.B.I. 7 : 125.

8. ***Saccharum Ravennae*** (L.) Murr. Syst. ed. XIII; 88; Haines Bot. B. & O. l. c. 1014; Blatter & McCann l. c.

287; *Andropogon Ravennae* L. Sp. Pl. ed. 2 : 1481 (1762); *Erianthus Ravennae* Beauv. Agrost. 14 (1812); F. B. I. 7 : 121.

9. **Saccharum rufipilum** Steud. l. c. 409; *Erianthus fulvus* Nees ex Steud. l. c.

10. **Saccharum sikkimensis** (H.f.) Narayanaswami; *Erianthus sikkimensis* H.f. in F.B.I. 7 : 123 (1897).

11. **Saccharum versicolor** Steud. l. c.; *Erianthus versicolor* Nees ex Steud. l. c. F.B.I. 7 : 124.

APPENDIX II.

ADDENDA.

The genus *Oryzopsis* was added to the Flora of Assam after the TSS. of this volume had been set up in type. The representative of this genus, *O. æquiglumis* Duthie, was collected in the Dzulake Valley above Khonoma in the Naga Hills at an altitude of 8,000 ft. The discovery of this species leads one to believe that the grass flora is very imperfectly known and that further investigation will bring most of the temperate genera of the Himalaya to light.

Oryzopsis will be found to key down to the tribe *Stipeæ*. An amended key to the genera will read as follows :—

Awn tripartite.	..	..	..	..	<i>Aristida.</i>
Awn simple.					
Floret cylindric or linear oblong; awn kneed and hirsute below the knee.	..	..	..	..	<i>Stipa.</i>
Floret broader; awn very fine, straight, caducous.	..	..	..	..	<i>Oryzopsis.</i>

ORYZOPSIS Michx.

Spikelets arranged in loose panicles, ovoid or lanceolate, usually awned; rhachilla jointed above the glumes, not continued above the lemma. *Floret* one, hermaphrodite; lemma shorter than the glumes. *Glumes* equal or sub-equal, persistent, usually acute or sub-acuminate, thin, 3-9-nerved, side-nerves often very short. *Lemma* convolute, more or less dorsally flattened, ovate to obovate or lanceolate, 5- (very rarely 3-) nerved, rather rigidly membranous to coriaceous, tips obscurely 2-lobed; callus very broad and short, obtuse; awn from the minute sinus in the tip, jointed on the lemma and readily deciduous, bristle-like, naked; palea almost as long as the lemma or rather shorter. *Lodicules* 2, rarely 3, hyaline. *Stamens* 3. *Ovary* glabrous; styles distinct, short; stigmas plumose, laterally exserted. *Grain* tightly enclosed by the

tightened lemma and palea, oblong, ovoid, ellipsoid or obovoid; embryo small.

Perennial tufted grasses with linear, usually long, flat, flaccid leaves; ligules membranous; panicles effuse or more or less contracted, often lax and often nodding.

Oryzopsis æquiglumis Duthie, Grass. N. W. Ind. (1883) 27.

A stout perennial grass. *Culms* up to 120 cm. tall, smooth and glabrous, usually simple. *Leaves* up to 30 cm. long, by 1 cm. wide, rough on the upper surface, very rough below, dark green, flaccid, linear, tapering to a long acuminate tip, narrowed at the base, scaberulous on the margins, glabrous; sheaths striate, rough, glabrous; ligules long, membranous, lacerate, 5 mm. long.

Inflorescence a very loose nodding panicle up to 40 cm. long, few-branched. Lower branches 2- to 3-nate, up to 18 cm. long, scabrid, naked at the base for 8 cm. then branching and with many spikelets; nodes 9 cm. apart in the lower portion of the panicle; pedicels short and long, 3-10 mm. long, scabrid. *Spikelets* 7.7-5 mm. long, oblong-acuminate in shape, green with pale purple tips. *Lower glume* 7.7-5 mm. long, elliptic acute when flattened, very thin, almost scarious, 5-nerved, the 2 lateral nerves very short; upper glume as long as the lower and of the same texture, 3-nerved, both minutely scaberulous on the dorsal surface. *Lemma* readily disarticulating from the glumes, narrowly elliptic-acuminate in shape, coriaceous in texture, shining and polished, 5-nerved, sparsely or thickly covered with a mat of brownish appressed hairs, 5 mm. long, awned; callus rounded, obtuse, glabrous; awn issuing from a minute sinus at the apex, up to 10 mm. long; palea of the same texture and length as the lemma, almost concealed by the overlapping margins of the lemma, keels rounded, 2-nerved.

DZULAKE VALLEY, KHONOMA, NAGA HILLS, ASSAM, 8,000 ft.

Tripogon bromoides Roth. Nov. Sp. (1821) 79.

A perennial cæspitose grass with wiry roots. *Culms* many, slender or stout, up to 45 cm. tall, smooth and glabrous,

polished. *Leaf-blades* very narrow, 3-4 mm. wide, up to 30 cm. long or very short, flat or convolute, smooth or minutely scaberulous, often minutely hairy or glabrous, with a few long white hairs behind the ligule; sheaths short, smooth, glabrous, polished, remaining long at the base of the culms, long hairy at the throat; ligule very short, membranous.

Inflorescence a spike up to 25 cm. long, rarely branched, with crowded cylindrical, slate-grey spikelets. *Rhachis* flat on the back, straight or flexuous, scabrid on the margins. *Spikelets* secund, crowded, cylindrical, up to 1.25 cm. long. *Lower glume* ovate or lanceolate, shortly aristate, deeply lobed on one side, 1-nerved, scabrid on the keel, 3-4 mm. long; upper glume 5.5 mm. long, oblong-lanceolate, shortly aristate, membranous, scaberulous on the back. *Florets* up to 18; lemmas reduced at the apex and sterile. Fertile lemmas 3.5 mm. long excluding the awns, broadly elliptic in shape, membranous in texture, 3-nerved, hairy on the callus, slate-coloured, 3-awned; between the awns the lemma is produced as an acute lobe; the awns are 3-3.5 mm. long; palea elliptic in outline, 2-keeled, scabrid on the keels; margins infolded. *Stamens* 3. *Lodicules* 2. *Grain* 2 mm. long; hilum 1/3 as long.

PEAK, SHILLONG, 5,000 ft.

This species falls into the same section as *T. filiformis* in the key but differs from it in its robust habit and larger spikelets. (See page 113).

ERRATUM.

The correct citation of *Acroceras crassiapiculatum* on page 200 is **A. crassiapiculatum** (Merr.) Alston in Trimen, Handbook Fl. Ceylon, VI. Suppl., (1931) 324, and not as stated.

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